

FCC PART 15B, CLASS B TEST REPORT

For

TRULY Semiconductors Ltd.

North of Dong Chong Road, Truly Industrial Area, Shanwei, China

FCC ID: OORZTONE-2W0003

Report Type: Class II Permissive Change	Product Type: Class B Personal Computer Peripheral
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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 *TRULY Semiconductors Ltd.*'s product, model number: *OEL2W0003-V1-E (FCC ID: OORZTONE-2W0003)* or the "EUT" in this report was a *Enterprise Zone Trusted Information Channel (Product Type: Class B Personal Computer Peripheral)*, which was measured approximately: 8.271 mm (L) × 3.391 mm (W) × 1.450 mm (H), rated input voltage: DC 5.0V from USB cable. The highest operating frequency is 84 MHz.

**All measurement and test data in this report was gathered from production sample serial number: 1505211 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2015-05-21.*

Objective

This test report is prepared on behalf of *TRULY Semiconductors Ltd.* 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 15B, Class B.

This is the CIIPC application of the device. The difference between the original device and the current one is as follows:

1. Microcontroller has updated from "AT32UC3A3256S-CTUT" to "AT32UC3A3256S-CTUT SL940".
2. Crystal (12Mhz) has updated from "CX5032-12M-10-12050Q-50-TR" to "XTL571100-F98-020".
3. Crystal (32.768Khz) has updated from "XTL731-S999-291" to "XTL721-S999-286".
4. Level translator IC has updated from "ST2349AQTR" to "LSF0204RUTR".

For the changes made to the device, all the test items were performed.

Related Submittal(s)/Grant(s)

No Related Submittal(s) /Grant(s).

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: Lighting & Reading Card (data transfer with computer)

EUT Exercise Software

“BurnIn test v5.3” exercise software was used.

Special Accessories

No special accessory.

Equipment Modifications

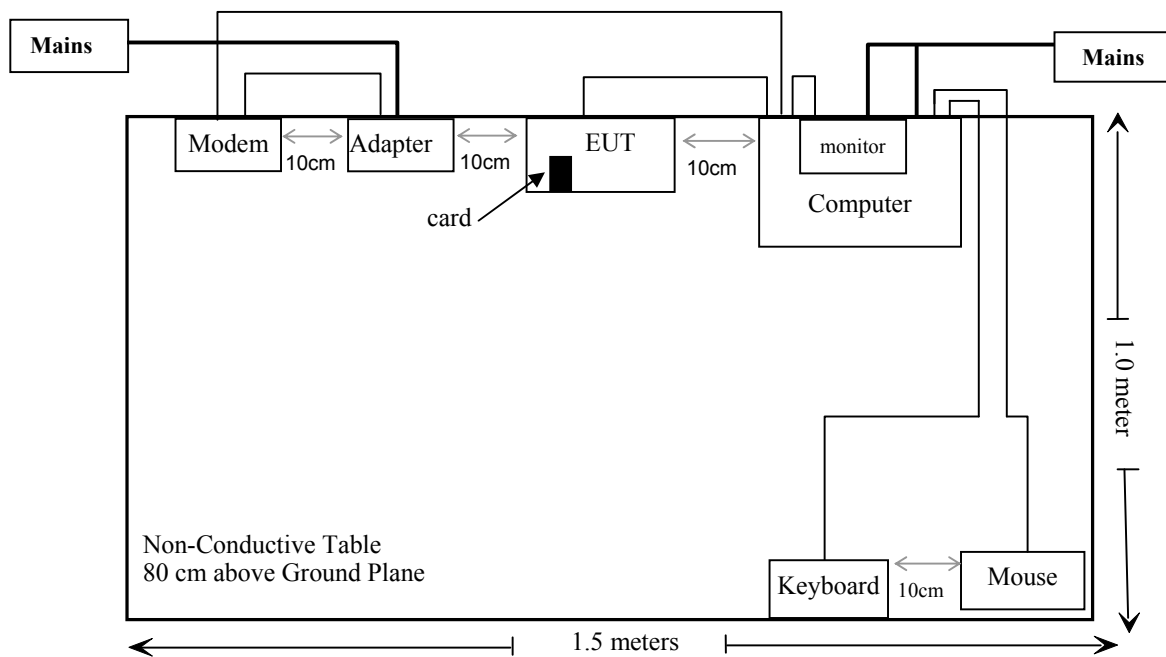
No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
DELL	computer	DCSCSF	LE513565
DELL	monitor	225MS	GB337
DELL	monitor	E178FPc	N51X2462
DELL	computer	D11M	NS2564813
Microsoft	Keyboard	X823093-002	0200706128743
Microsoft	Mouse	2SJ-00004	0204608267209
Longway	Modem	N/A	LW157621
Longway	Adapter	TYP60-1207000Z	LW516654
N/A	Card	N/A	N/A

External I/O Cable

Cable Description	Length (m)	From/Port	To
Shielded detachable RS232 cable	1.0	computer	modem
shielded detachable VGA cable	1.0	computer	monitor
Un-shield Un-detachable DC cable	0.5	Adapter	modem
Shielded Un-detachable USB cable	1.2	keyboard	computer
Shielded Un-detachable USB cable	1.2	mouse	computer
Un-shielded detachable AC cable	1.2	monitor	mains
Un-shielded detachable AC cable	1.2	computer	mains
Shielded detachable USB cable	1.0	EUT	computer
Un-shielded detachable AC cable	1.0	Adapter	mains

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

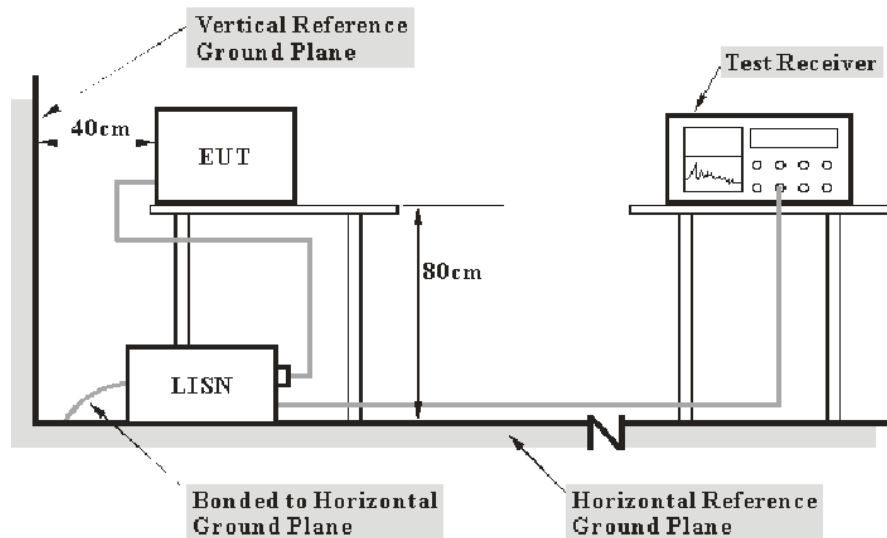
Measurement Uncertainty

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 host PC was connected to a 120 VAC/60 Hz power source.

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

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.

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	ESH2-Z5	892107/021	2014-06-09	2015-06-09
Rohde & Schwarz	Transient Limiter	ESH3Z2	DE25985	2015-05-14	2016-05-14
R&S	L.I.S.N	ESH3-Z5	100113	NCR	NCR
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:

6.4 at 8.849190 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

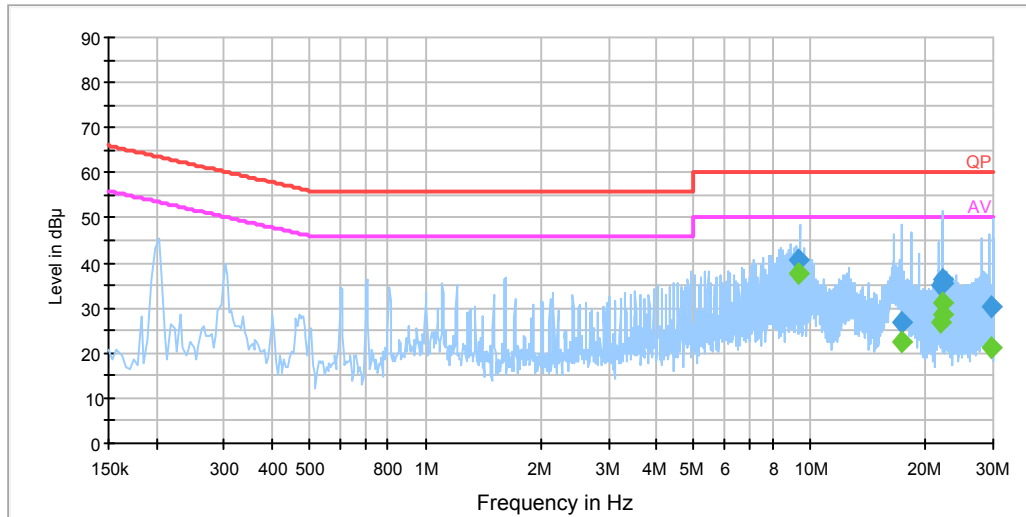
Temperature:	22 °C
Relative Humidity:	47 %
ATM Pressure:	101.0 kPa

The testing was performed by Scott Lee on 2015-05-28.

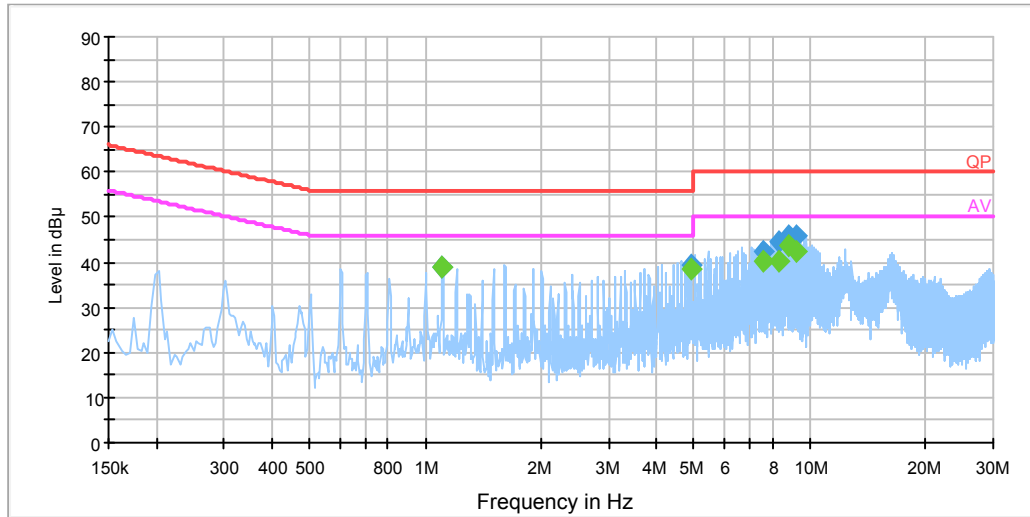
EUT Operation Mode: Lighting

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)
9.357090	40.5	20.1	60.0	19.5	QP
9.357090	37.6	20.1	50.0	12.4	Ave.
17.401210	26.9	20.1	60.0	33.1	QP
17.401210	22.6	20.1	50.0	27.4	Ave.
21.834590	34.9	20.1	60.0	25.1	QP
21.834590	27.0	20.1	50.0	23.0	Ave.
22.130290	36.3	20.1	60.0	23.7	QP
22.130290	31.3	20.1	50.0	18.7	Ave.
22.134710	35.6	20.1	60.0	24.4	QP
22.134710	28.6	20.1	50.0	21.4	Ave.
29.553110	30.4	20.2	60.0	29.6	QP
29.553110	21.3	20.2	50.0	28.7	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)
1.105410	38.9	20.0	56.0	17.1	QP
1.105410	39.1	20.0	46.0	6.9	Ave.
4.928110	39.5	20.0	56.0	16.5	QP
4.928110	38.5	20.0	46.0	7.5	Ave.
7.542430	42.5	20.1	60.0	17.5	QP
7.542430	40.2	20.1	50.0	9.8	Ave.
8.344810	44.6	20.1	60.0	15.4	QP
8.344810	40.3	20.1	50.0	9.7	Ave.
8.849190	45.9	20.1	60.0	14.1	QP
8.849190	43.6	20.1	50.0	6.4	Ave.
9.249690	45.9	20.1	60.0	14.1	QP
9.249690	42.6	20.1	50.0	7.4	Ave.

Note:

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

FCC §15.109 - RADIATED SPURIOUS EMISSIONS**Applicable Standard**

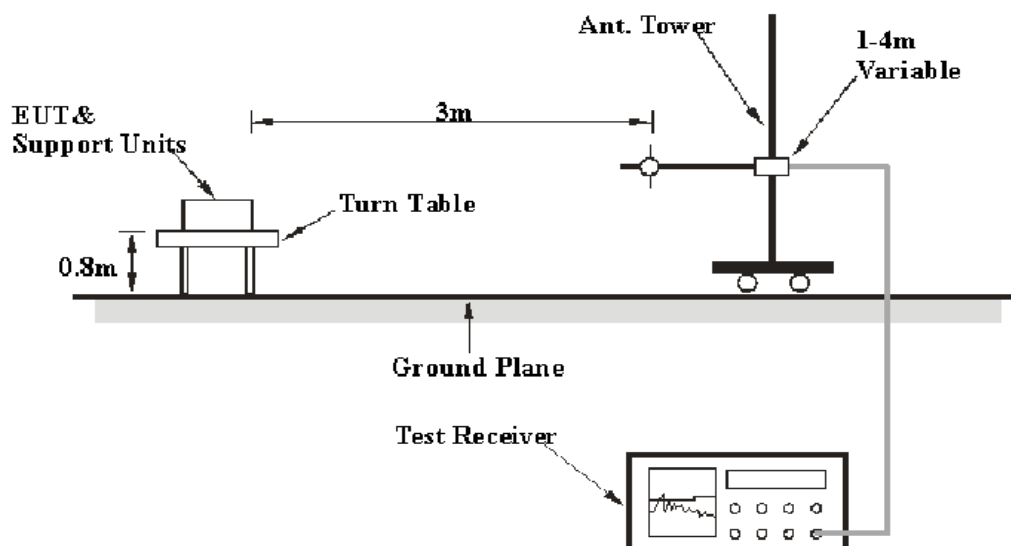
FCC §15.109

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 host PC was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 1 GHz.

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

Test Procedure

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 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	2014-09-30	2015-09-30
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2014-11-12	2015-11-12
Sunol Sciences	Broadband Antenna	JB1	A040904-2	2014-12-07	2017-12-06
TDK	Chamber	Chamber A	2#	2012-10-15	2015-10-15
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:

10.25 dB at 47.985250 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:	22 °C
Relative Humidity:	47 %
ATM Pressure:	101.0 kPa

The testing was performed by Scott Lee on 2015-05-26.

*EUT Operation Mode: Reading card***30 MHz – 1 GHz**

Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB/m)	Corrected Amplitude (dBμV/m)	FCC Part 15B	
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)
35.900875	17.26	QP	218.0	1.2	V	-10.8	28.06	40.00	11.94
36.532000	14.81	QP	66.0	1.0	V	-11.2	26.01	40.00	13.99
47.985250	11.15	QP	26.0	1.0	V	-18.6	29.75	40.00	10.25
53.591125	4.31	QP	17.0	1.2	V	-20.1	24.41	40.00	15.59
526.262375	15.20	QP	15.0	1.1	V	-8.5	23.70	46.00	22.30
799.670000	31.06	QP	115.0	1.2	V	-4.3	35.36	46.00	10.64

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 *******