FCC PART 15C

TEST REPORT

For

INGENICO

9 Avenue de la Gare-Rolvatain TGV, BP 25156, Valence Cedex 9, France

FCC ID: XKB-L2500CLWIBT

Report Type:	Product Name:
Original Report	Link/2500

Test Engineer:	*Kevin Hu*
Report Number:	RXM170217051A
Report Date:	2017-03-10
Reviewed By:	Henry Ding EMC Leader
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Chengdu) No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China Tel: 028-65523123, Fax: 028-65525125 www.baclcorp.com

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The ***INGENICO***'s product, model number: ***Link/2500 CL/WiFi/BT (FCC ID: XKB-L2500CLWIBT)*** (the "EUT") in this report was a ***Link/2500,*** which was measured approximately: 129 mm (L) x 70 mm (W) x 17 mm (H), rated input voltage: DC 3.7V from rechargeable Li-ion battery or DC 5V from adapter.

Adapter information:
MODEL: PSAI05R-050QL6
INPUT: 100-240V ~ 0.3A 50-60Hz 11-15VA
OUTPUT: DC 5V, 1.0A MAX.

**All measurement and test data in this report was gathered from final production sample, serial number: 170217051 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-02-17, and EUT conformed to test requirement.*

Objective

This Type approval report is prepared on behalf of ***INGENICO*** in accordance with Part 2, Subpart J, and Part 15, Subparts A and C of the Federal Communications Commission's rules.

The objective is to determine the compliance of the EUT with FCC rules, sec 15.203, 15.205, 15.207, 15.209 and 15.225.

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: XKB-L2500CLWIBT.
FCC Part 15C DSS submissions with FCC ID: XKB-L2500CLWIBT.
FCC Part 15.407 NII submissions with FCC ID: XKB-L2500CLWIBT.

Test Methodology

All measurements detailed in this Test Report were performed in accordance with ANSI C63.10-2013 “American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices”.

All emissions measurement was performed and Bay Area Compliance Laboratories Corp. (Chengdu). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

The Bay Area Compliance Laboratories Corp. Chengdu’s measurement Uncertainties (calculated for a k=2 Coverage Factor corresponding to approximately 95% Coverage) were as follows:

-For all of the AC Line Conducted Emissions Tests reported herein: ±3.17 dB.
-For of all of the Direct Antenna Conducted Emissions Tests reported herein: ±0.56 dB.

-For of all of the direct Radiated Emissions Tests reported herein are:
30 MHz to 200 MHz: ±4.7 dB;
200 MHz to 1 GHz: ±6.0 dB;
1 GHz to 6 GHz: ±5.13dB; and,
6 GHz to 40 GHz: ±5.47dB.

And the uncertainty will not be taken into consideration for all test data recorded in the report.

Test Facility

The test site used by BACL to collect test data is located in the No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Test site at BACL 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 April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207	AC Line Conducted Emission	Compliance
§15.225 §15.209 §15.205	Radiated Emission Test	Compliance
§15.225(e)	Frequency Stability	Compliance*
§15.215(c)	20 dB Emission Bandwidth	Compliance*

Note:
Compliance*: the device is same PCB Layout with Model:LINK/2500 CL/3G/WiFi/BT, FCC ID:XKB-L2500CL3GWIBT, the differences between the original devices is depressing WWAN (2G/3G) function and replacing SIM to SAM function. The test items, please refer to the Model:LINK/2500 CL/3G/WiFi/BT's report: RXM160823052-00B

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a test mode.

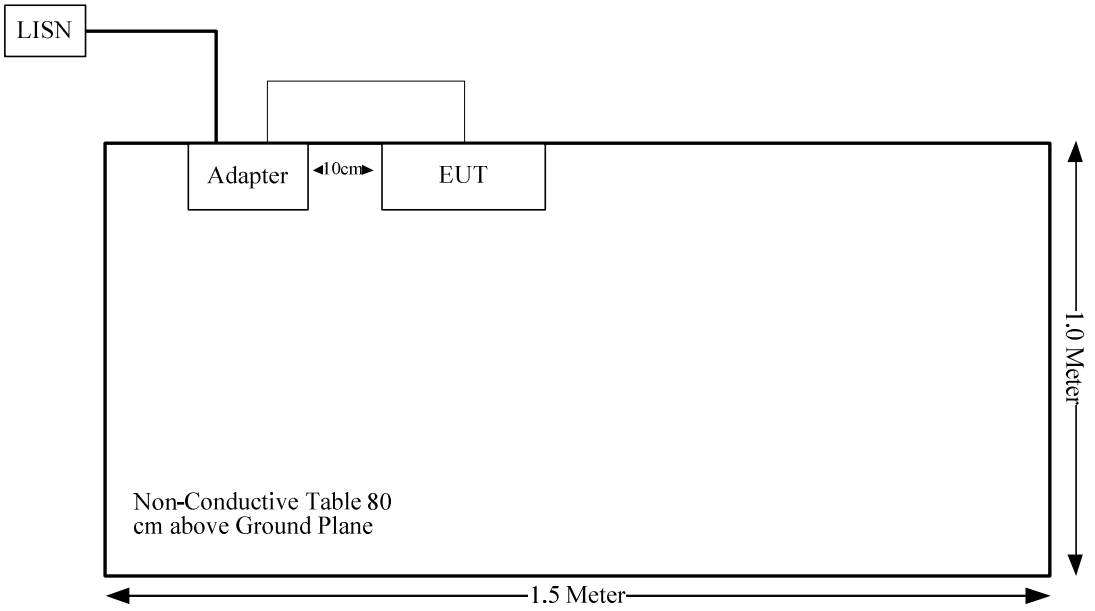
EUT Exercise Software

No software was performed under test.

Support Cable List and Details

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	To
USB Cable	no	no	1.1	Adapter	EUT

Block Diagram of Test Setup



FCC§15.203 - ANTENNA REQUIREMENT

Applicable Standard

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

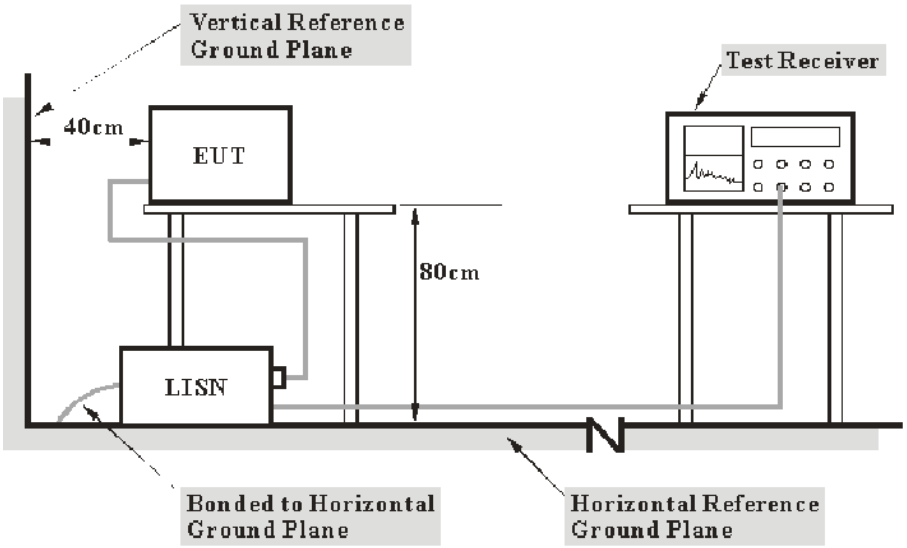
Antenna Connected Construction

The EUT has one integral antenna arrangement, which was permanently attached and fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

FCC §15.207 – AC LINE CONDUCTED EMISSION

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 setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 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 the Main LISN with AC 120 V/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 Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS 30	836858/0016	2016-12-02	2017-12-01
Rohde & Schwarz	L.I.S.N.	ENV216	100018	2016-12-02	2017-12-01
Rohde & Schwarz	PULSE LIMITER	ESH3Z2	DE14781	2016-10-31	2017-10-30
Unknown	Conducted Cable	Unknown	NO.5	2016-11-10	2017-11-09
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

*** Statement of Traceability:** BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

Test Procedure

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

According FCC publication number 174176,for a device with a permanent antenna operating at or below 30 MHz, the measurements done with a suitable dummy load, in lieu of the permanent antenna under the following conditions: (1) perform the AC line conducted tests with the permanent antenna to determine compliance with the Section 15.207 limits outside the transmitter's fundamental emission band; (2) retest with a dummy load in lieu of the permanent antenna to determine compliance with the Section 15.207 limits within the transmitter's fundamental emission band.

Corrected Amplitude & Margin Calculation

The basic equation is as follows:

$V_C = V_R + A_C + VDF$

Herein,
V_C: corrected voltage amplitude
V_R: reading voltage amplitude

A_c: attenuation caused by cable loss

VDF: voltage division factor of AMN or ISN

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

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207.

Test Data

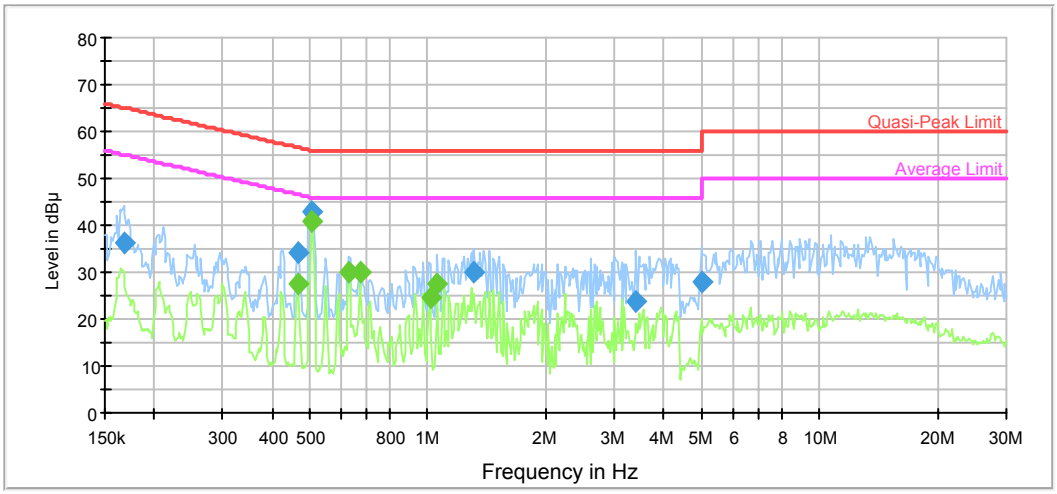
Environmental Conditions

Temperature:	25.4 °C
Relative Humidity:	50 %
ATM Pressure:	95.9 kPa

The testing was performed by Kevin Hu on 2017-03-06.

Test Mode: Transmitting

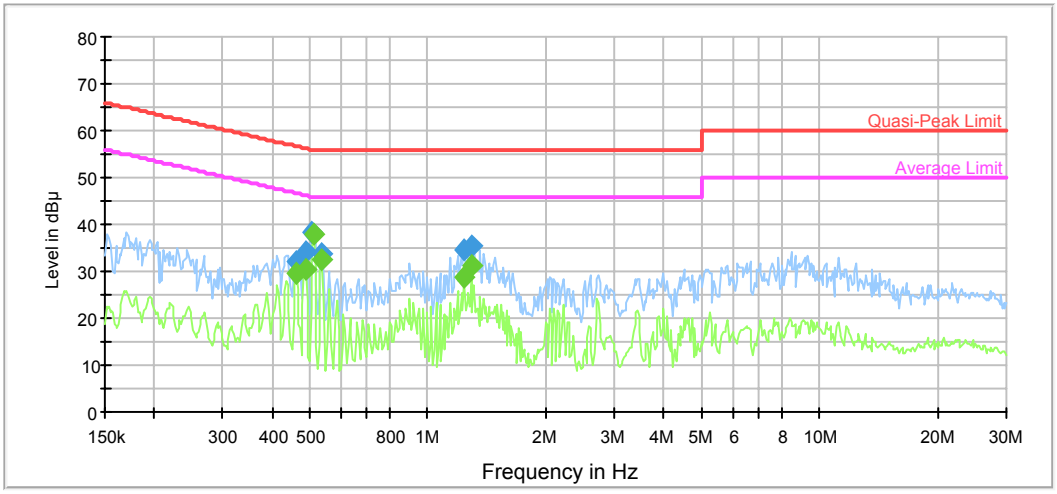
AC 120V, 60 Hz, Line:



Frequency (MHz)	Quasi Peak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.167702	36.4	9.000	L1	19.7	28.7	65.1	Compliance
0.468757	34.0	9.000	L1	19.7	22.5	56.5	Compliance
0.507637	42.8	9.000	L1	19.7	13.2	56.0	Compliance
1.310256	30.2	9.000	L1	19.7	25.8	56.0	Compliance
3.408946	23.6	9.000	L1	19.7	32.4	56.0	Compliance
4.997188	28.0	9.000	L1	19.7	28.0	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.465037	27.6	9.000	L1	19.7	19.0	46.6	Compliance
0.507637	40.7	9.000	L1	19.7	5.3	46.0	Compliance
0.629488	29.8	9.000	L1	19.7	16.2	46.0	Compliance
0.670921	29.9	9.000	L1	19.7	16.1	46.0	Compliance
1.015358	24.6	9.000	L1	19.7	21.4	46.0	Compliance
1.056628	27.3	9.000	L1	19.7	18.7	46.0	Compliance

AC120 V, 60 Hz, Neutral:



Frequency (MHz)	Quasi Peak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.461346	32.2	9.000	N	19.6	24.5	56.7	Compliance
0.487810	34.2	9.000	N	19.6	22.0	56.2	Compliance
0.507637	38.2	9.000	N	19.6	17.8	56.0	Compliance
0.536756	33.8	9.000	N	19.6	22.2	56.0	Compliance
1.239175	34.7	9.000	N	19.6	21.3	56.0	Compliance
1.289541	35.5	9.000	N	19.6	20.5	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.461346	29.4	9.000	N	19.6	17.3	46.7	Compliance
0.487810	30.6	9.000	N	19.6	15.6	46.2	Compliance
0.511698	37.8	9.000	N	19.6	8.2	46.0	Compliance
0.536756	32.5	9.000	N	19.6	13.5	46.0	Compliance
1.239175	28.9	9.000	N	19.6	17.1	46.0	Compliance
1.289541	31.2	9.000	N	19.6	14.8	46.0	Compliance

FCC§15.225, §15.205 & §15.209 - RADIATED EMISSIONS TEST

Applicable Standard

As per FCC Part 15.225

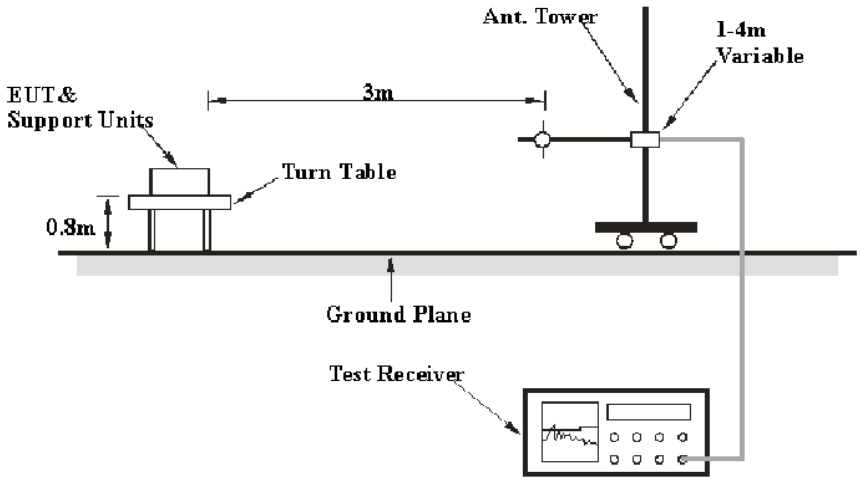
(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

EUT Setup



The radiated emission tests were performed in the 3-meter chamber test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC Part Subpart C limits.

The spacing between the peripherals was 10 cm.

EMI Test Receiver Setup

The system was investigated from 9 kHz to 1 GHz.

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

Frequency Range	RBW	Video B/W	Detector
9 kHz – 150 kHz	200 Hz	1 kHz	QP
150 kHz – 30 MHz	9 kHz	30 kHz	QP
30 MHz – 1000 MHz	120 kHz	300 kHz	QP

Corrected Amplitude & Margin Calculation

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

Corr. Ampl. = Meter Reading + Antenna Factor + Cable Loss - 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 maximum limit. The equation for margin calculation is as follows:

Margin = Limit - Corr. Ampl.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A121808	2016-04-10	2019-04-09
Unknown	RF Cable (below 1GHz)	Unknown	NO.1	2016-11-10	2017-11-09
Unknown	RF Cable (below 1GHz)	Unknown	NO.4	2016-11-10	2017-11-09
The Electro-Mechanics Company	Passive Loop Antenna	6512	9706-1224	2014-11-30	2017-11-29

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Test Results Summary

According to the data in the following table, the EUT complied with the FCC Part 15.209&15.225.

Test Data

Environmental Conditions

Temperature:	23.5 °C
Relative Humidity:	49 %
ATM Pressure:	96.3 kPa

** The testing was performed by Kevin Hu on 2017-03-05.*

Test mode: Transmitting

1) Emissions (9 kHz~30 MHz):

Frequency (MHz)	Receiver		Rx Antenna Factor dB(1/m)	Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)						
13.56	58.6	QP	32.08	0.35	21.44	69.59	124.00	54.41
8.91	32.1	QP	32.63	0.28	21.42	43.59	69.54	25.95
27.12	30.2	QP	30.48	0.44	21.45	39.67	69.54	29.87
13.553	32.4	QP	32.08	0.35	21.44	43.39	90.50	47.11
13.567	32.7	QP	32.08	0.35	21.44	43.69	90.50	46.81
13.121	27.4	QP	32.06	0.35	21.44	38.37	80.50	42.13
13.956	28.0	QP	32.10	0.35	21.44	39.01	80.50	41.49

2) Spurious Emissions (30 MHz -1 GHz):

Frequency (MHz)	Receiver		Rx Antenna		Cable loss (dB)	Amplifier Gain (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
	Reading (dBμV)	Detector (PK/QP/AV)	Polar (H/V)	Factor dB(1/m)					
30.97	29.67	QP	H	22.09	0.32	28.57	23.51	40.00	16.49
121.18	27.72	QP	H	15.74	0.82	28.13	16.15	43.50	27.35
201.69	29.07	QP	H	13.13	0.93	27.76	15.37	43.50	28.13
275.41	33.33	QP	H	13.81	1.26	27.49	20.91	46.00	25.09
474.26	28.55	QP	H	17.97	1.60	28.66	19.46	46.00	26.54
813.76	25.23	QP	H	21.98	2.31	28.41	21.11	46.00	24.89
30.97	28.66	QP	V	22.09	0.32	28.57	22.50	40.00	17.50
96.93	42.66	QP	V	9.88	0.49	28.32	24.71	43.50	18.79
119.24	30.53	QP	V	15.35	0.73	28.15	18.46	43.50	25.04
351.07	33.55	QP	V	15.30	1.34	27.83	22.36	46.00	23.64
361.74	30.52	QP	V	15.70	1.49	27.93	19.78	46.00	26.22
498.51	30.05	QP	V	18.11	1.61	28.81	20.96	46.00	25.04

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