



NVLAP LAB CODE 200707-0



FCC PART 15.249 MEASUREMENT AND TEST REPORT

For

Master Lock Company

P.O. Box 927 137 W. Forest Hill Ave. Oak Creek, WI 53154

FCC ID: MZR-4843DATSEN

Report Type: Original Report	Product Type: Back up/Towing Camera (2.4GHz Transmitter)
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Report Number: <u>RSZ08121803</u>	
Report Date: <u>2009-03-27</u>	
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* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "*" Rev. 2

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Master Lock Company's* product, model: *4843DATSEN* or the "EUT" as referred to in this report is a *Back up / Towing Camera*, rated input voltage: DC 12V battery.

Note: *4843DATSEN* is a wireless camera, it use 2.4 GHz frequency transmitting data. AV signal can be collected modulated and be transmitted by the product. So you can use receiver to monitor. 4 channels are available for *4843DATSEN* and operate at 2414, 2432, 2450, 2468 MHz, the modulation is FM.

Mechanical Description of EUT

The *Master Lock Company's* product, model number: *4843DATSEN*, measures approximately 18.5 cm L x 3.1 cm W x 3.1 cm H, the weight is 148g.

** All measurement and test data in this report was gathered from production sample serial number: 0812055 (Assigned by BAEL, Shenzhen). The EUT was received on 2008-12-18.*

EUT Photograph



Please see additional photos in Exhibit B&C

Objective

This Type approval report is prepared on behalf of *Master Lock Company* in accordance with Part 2, Subpart J, and Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.249 rules.

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, 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 in 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 November 21, 2007. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

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.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).



NVLAP LAB CODE 200707-0

The current scope of accreditations can be found at <http://ts.nist.gov/Standards/scopes/2007070.htm>

SYSTEM TEST CONFIGURATION

Justification

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

Special Accessories

N/A

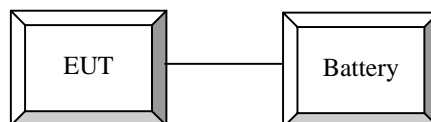
Equipment Modifications

No modifications were made to the unit tested.

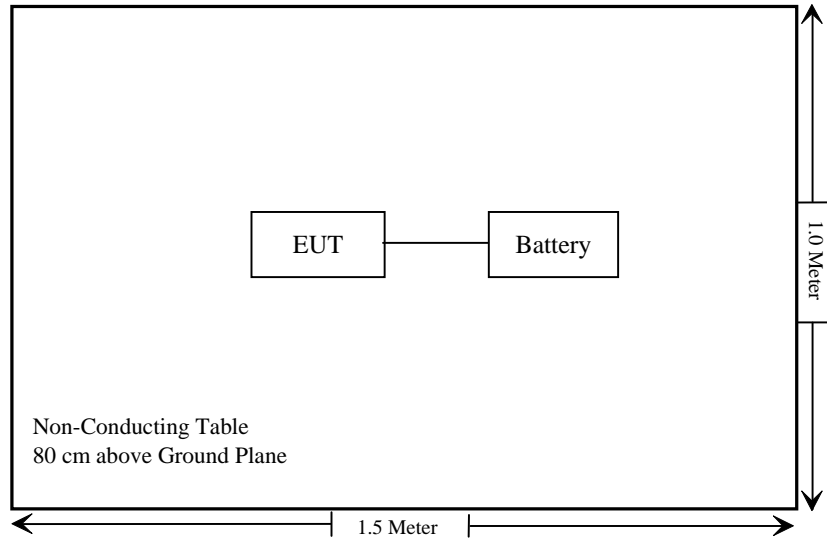
External I/O Cable

Cable Description	Length (m)	From/Port	To
Unshielded Detachable Power Cable	0.5	EUT	Battery

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliant
§15.207(a)	Conduction Emissions	N/A *
§15.205, §15.209, 15.249(a), §15.249(c)	Radiated Emissions	Compliant**
§15.249(d)	Out of Band Emissions	Compliant

Note: * Battery operation.

** Within measurement uncertainty.

§15.203 - ANTENNA REQUIREMENT

Applicable Standard

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

Antenna Connector Construction

The EUT antenna is a permanently attached antenna, the maximum of antenna gain is 3dBi, which in accordance to section 15.203, is considered sufficient to comply with the provisions of this section.

Result: Compliant.

Please refer to the EUT photos.

§15.205 §15.209 §15.249(a) §15.249(d) - RADIATED EMISSIONS

Applicable Standard

As per §15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental Frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

As per §15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

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 NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Bay Area Compliance Laboratories Corp. (Shenzhen) is ± 4.0 dB.

Test Equipment Setup

The spectrum analyzer or receiver is set as:

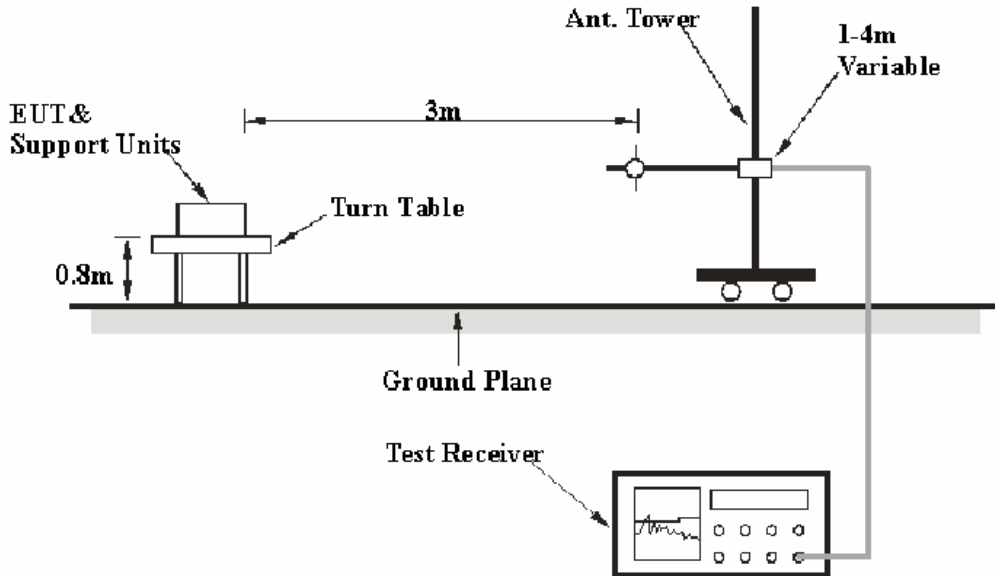
Below 1000MHz:

$$\text{RBW} = 100 \text{ kHz} / \text{VBW} = 300 \text{ kHz} / \text{Sweep} = \text{Auto}$$

Above 1000MHz:

- (1) Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto
- (2) Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

EUT Setup



The radiated emission and out of band emission tests were performed in the 3 meters chamber B, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC 15.209 and FCC 15.249 limits.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2008-11-15	2009-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2008-10-16	2009-10-16
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2008-08-14	2009-08-14
HP	Amplifier	8449B	3008A00277	2008-09-29	2009-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2008-09-25	2009-09-25
Rohde & Schwarz	Spectrum Analyzer	FSEM30	849720/019	2008-05-09	2009-05-09

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

For the radiated emissions test, the EUT, and all support equipment power cords 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.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

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 Part 15.209 & 15.249, with the worst margin reading of:

Below 1GHz:

5.6 dB at **956.656325 MHz** in the **Horizontal** polarization

Above 1GHz:

0.27 dB at **4828 MHz** in the **Horizontal** polarization for low Channel
2.93 dB at **4864 MHz** in the **Horizontal** polarization for middle Channel
2.50 dB at **4936 MHz** in the **Horizontal** polarization for high Channel

Test Data

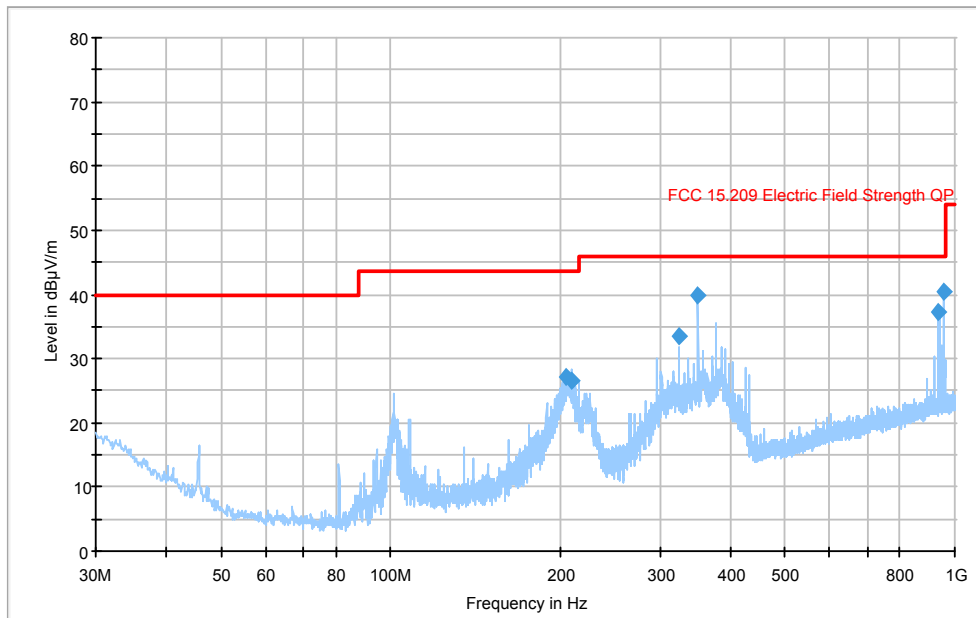
Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Kvass Yang on 2009-01-18.

Test Mode: Transmitting

Below 1 GHz:



Frequency (MHz)	Corrected Amplitude (dBµV/m)	Antenna Height (cm)	Antenna Polarity (H/V)	Turntable Position (deg)	Correction Factor (dB)	FCC Limit (dBµV/m)	Margin (dB)
956.656325	40.4	102.0	H	36.0	-3.0	46.0	5.6
351.017375	39.9	103.0	H	55.0	-13.1	46.0	6.1
935.862875	37.2	102.0	H	34.0	-3.4	46.0	8.8
324.035600	33.6	102.0	H	51.0	-13.7	46.0	12.4
205.038525	27.1	181.0	H	359.0	-17.1	43.5	16.4
209.303325	26.7	192.0	H	0.0	-17.4	43.5	16.8

Above 1 GHz:

Freq. (MHz)	S.A. Reading (dBμV/m)	Detector PK/QP/AV	Table Direction Degree	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	FCC Part15.249/209		
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	Remarks
Low Channel (2414 MHz)												
4828	43.37	AV	67	1.45	H	36.40	7.66	33.70	53.73	54	0.27*	Harmonic
4828	40.90	AV	168	1.29	V	35.16	7.66	33.70	50.02	54	3.98*	Harmonic
7242	32.06	AV	328	1.79	H	39.20	9.14	33.60	46.8	54	7.20	Harmonic
9656	29.04	AV	299	1.39	V	40.20	10.85	34.05	46.04	54	7.96	Harmonic
9656	29.06	AV	284	1.85	H	40.15	10.85	34.05	46.01	54	7.99	Harmonic
7242	32.04	AV	5	1.95	V	38.05	9.14	33.60	45.63	54	8.37	Harmonic
4828	52.56	PK	67	1.45	H	36.40	7.66	33.70	62.92	74	11.08	Harmonic
9656	43.24	PK	284	1.85	H	40.15	10.85	34.05	60.19	74	13.81	Harmonic
9656	43.02	PK	299	1.34	V	40.20	10.85	34.05	60.02	74	13.98	Harmonic
7242	45.05	PK	328	1.79	H	39.20	9.14	33.60	59.79	74	14.21	Harmonic
7242	45.81	PK	5	1.95	V	38.05	9.14	33.60	59.40	74	14.60	Harmonic
4828	50.13	PK	168	1.29	V	35.16	7.66	33.70	59.25	74	14.75	Harmonic
2414	70.58	AV	310	1.58	H	31.05	7.95	33.90	75.68	94	18.32	Fund.
2414	71.05	AV	336	1.30	V	30.40	7.95	33.90	75.50	94	18.50	Fund.
2414	75.68	PK	336	1.30	V	30.40	7.95	33.90	80.13	114	33.87	Fund.
2414	74.58	PK	310	1.58	H	31.05	7.95	33.90	79.68	114	34.32	Fund.

Freq. (MHz)	S.A. Reading (dBμV/m)	Detector PK/QP/AV	Table Direction Degree	Test Antenna			Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	FCC Part15.249/209		
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBμV/m)	Margin (dB)	Remarks
Middle Channel (2432 MHz)												
4864	40.62	AV	59	1.60	H	36.45	7.70	33.70	51.07	54	2.93*	Harmonic
4864	40.58	AV	212	2.00	V	35.20	7.70	33.70	49.78	54	4.22	Harmonic
9728	29.58	AV	155	1.75	H	41.50	10.95	34.10	47.93	54	6.07	Harmonic
7296	32.42	AV	178	2.00	H	39.50	9.15	33.60	47.47	54	6.53	Harmonic
9728	30.39	AV	200	1.95	V	40.30	10.95	34.10	46.54	54	7.46	Harmonic
7296	32.56	AV	174	1.70	V	38.05	9.15	33.60	46.16	54	7.84	Harmonic
9728	42.97	PK	155	1.75	H	41.50	10.95	34.10	61.32	74	12.68	Harmonic
7296	45.19	PK	178	2.00	H	39.50	9.15	33.60	60.24	74	13.76	Harmonic
7296	46.12	PK	174	1.70	V	38.05	9.15	33.60	59.72	74	14.28	Harmonic
9728	42.31	PK	200	1.95	V	40.30	10.95	34.10	59.46	74	14.54	Harmonic
4864	47.98	PK	59	1.60	H	36.45	7.70	33.70	58.43	74	15.57	Harmonic
4864	48.46	PK	212	2.00	V	35.20	7.70	33.70	57.66	74	16.34	Harmonic
2432	72.54	AV	20	1.82	V	30.45	8.02	33.85	77.16	94	16.84	Fund.
2432	69.70	AV	61	1.92	H	31.20	8.02	33.85	75.07	94	18.93	Fund.
2432	77.46	PK	20	1.82	V	30.45	8.02	33.85	82.08	114	31.92	Fund.
2432	75.22	PK	61	1.92	H	31.20	8.02	33.85	80.59	114	33.41	Fund.

Freq. (MHz)	S.A. Reading (dB μ V/m)	Detector PK/QP/AV	Table Direction Degree	Test Antenna			Cable Loss (dB)	Pre- Amp. Gain (dB)	Cord. Amp. (dB μ V/m)	FCC Part15.249/209		
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dB μ V/m)	Margin (dB)	Remarks
High Channel (2468 MHz)												
4936	40.80	AV	100	2.00	H	36.50	7.90	33.70	51.5	54	2.50*	Harmonic
4936	40.62	AV	285	1.65	V	35.20	7.90	33.70	50.02	54	3.98*	Harmonic
7404	33.03	AV	360	1.90	H	39.55	9.60	33.60	48.58	54	5.42	Harmonic
7404	32.80	AV	66	1.72	V	38.12	9.60	33.60	46.92	54	7.08	Harmonic
7404	46.66	PK	360	1.90	H	39.55	9.60	33.60	62.21	74	11.79	Harmonic
4936	50.57	PK	100	2.00	H	36.50	7.90	33.70	61.27	74	12.73	Harmonic
7404	46.27	PK	66	1.72	V	38.12	9.60	33.60	60.39	74	13.61	Harmonic
4936	50.41	PK	285	1.65	V	35.20	7.90	33.70	59.81	74	14.19	Harmonic
9872	29.14	AV	120	1.53	V	40.38	11.15	41.50	39.17	54	14.83	Harmonic
2468	72.64	AV	292	4.53	H	30.50	8.01	33.90	77.25	94	16.75	Fund.
9872	31.06	AV	168	1.20	H	34.18	11.15	41.50	34.89	54	19.11	Harmonic
9872	43.08	PK	120	1.53	V	40.38	11.15	41.50	53.11	74	20.89	Harmonic
2468	65.96	AV	360	1.31	V	30.42	8.01	33.90	70.49	94	23.51	Fund.
9872	43.90	PK	168	1.20	H	34.18	11.15	41.50	47.73	74	26.27	Harmonic
2468	76.30	PK	292	1.53	H	30.50	8.01	33.90	80.91	114	33.09	Fund.
2468	73.08	PK	360	1.31	V	30.42	8.01	33.90	77.61	114	36.39	Fund.

* Within measurement uncertainty.

§15.249(d) – OUT OF BAND EMISSIONS

Applicable Standard

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Test Procedure

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 mete, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission at the band edge. The receiving antenna should be changed the polarization both of horizontal and vertical.

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
HP	Amplifier	8447E	1937A01046	2008-11-15	2009-11-15
Rohde & Schwarz	EMI Test Receiver	ESCI	100224	2008-10-16	2009-10-16
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2008-08-14	2009-08-14
HP	Amplifier	8449B	3008A00277	2008-09-29	2009-09-29
Sunol Sciences	Horn Antenna	DRH-118	A052604	2008-09-25	2009-09-25

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) Corp. attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	100.0 kPa

The testing was performed by Kvass Yang on 2009-01-18.

Test Mode: Transmitting

Test Result: Compliant.

Freq. (MHz)	S.A. Reading (dBµV/m)	Detector (PK/AV)	Table Direction (Degree)	Test Antenna			Cable Loss (dB)	Pre- Amp. Gain (dB)	Cord. Amp. (dBµV/m)	FCC 15.249/15.209	
				Height (m)	Polar (H/V)	Factor (dB/m)				Limit (dBµV/m)	Margin (dB)
2386.99	32.80	AV	158	1.42	H	30.75	7.80	33.90	37.45	54	16.55
2312.72	32.84	AV	327	2.00	V	30.50	7.65	33.90	37.09	54	16.91
2489.22	31.82	AV	152	1.22	V	30.52	8.01	33.90	36.45	54	17.55
2489.48	31.54	AV	296	2.00	H	30.52	8.01	33.90	36.17	54	17.83
2489.22	47.69	PK	152	1.22	V	30.52	8.01	33.90	52.32	74	21.68
2386.99	46.44	PK	158	1.42	H	30.75	7.80	33.90	51.09	74	22.91
2489.48	46.01	PK	296	2.00	H	30.52	8.01	33.90	50.64	74	23.36
2312.72	46.17	PK	327	2.00	V	30.50	7.65	33.90	50.42	74	23.58

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