ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Product Name:	**Stand-Alone Door Controller with I/O Relay Module**
Brand Name:	**KANTECH**
Model No.:	**SA-550**
Model Difference:	**N/A**
FCC ID:	**V8512SA550**
Report No.:	**ER/2012/A0021**
Issue Date:	**Feb. 26, 2013**
FCC Rule Part:	**§15.209**
Prepared for	**TYCO SAFETY PRODUCTS / KANTECH 9995L de Catania Ave. Brossard Quebec J4Z 3V7 Canada**
Prepared by	**SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803**

Testing Laboratory
0513

VERIFICATION OF COMPLIANCE

Applicant:	TYCO SAFETY PRODUCTS / KANTECH 9995L de Catania Ave. Brossard Quebec J4Z 3V7 Canada
Product Description:	Stand-Alone Door Controller with I/O Relay Module
Brand Name:	KANTECH
Model No.:	SA-550
FCC ID:	V8512SA550
Model Difference:	N/A
File Number:	ER/2012/A0021
Date of test:	Oct. 17, 2012 ~Feb. 26, 2013
Date of EUT Received:	Oct. 17, 2012

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd., Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 2009 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.209.

The test results of this report relate only to the tested sample identified in this report.

Test By:	Marcus Tseng	***Date:***	Feb. 26, 2013
	Marcus Tseng / Engineer		
Prepared By:	Tiffany Kao	***Date:***	Feb. 26, 2013
	Tiffany Kao / Clerk		
Approved By	Jim Chang	***Date:***	Feb. 26, 2013
	Jim Chang / Supervisor		

Version

Version No.	Date	Description
00	Feb. 26, 2013	Initial creation of document

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1. GENERAL INFORMATION

1.1. Product Description

General:

Product Name:	Stand-Alone Door Controller with I/O Relay Module
Brand Name:	KANTECH
Model No.:	SA-550
Model Difference:	N/A
Hardware Version:	REV : D
Software Version	N/A
Power Supply:	12Vdc

Transmitter:

Operating Frequency	125kHz
Transmit Power	< 105dBuV/m at 3m.
Number of Channels	1
Operating Mode	Point-to-Point
Modulation Type:	FSK

This report applies for Low Power Transmitters below 1GHz.

This report is intended for the purpose of Market Surveillance. It may not contain the complete test result of full test items subject to comply with specific ruling part.

1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **V8512SA550** filing to comply with Section 15.209 of the FCC Part 15, Subpart C Rules. The composite system (digital device) is compliance with Subpart B is authorized under a Verification procedure.

1.3. Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 2009. Radiated testing was performed at an antenna to EUT distance 3 meters.

1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2009. FCC Registration Number are: 990257 and 236194, Canada Registration Number: 4620A-4

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 &10 meters) and FCC Registration Number: 94644.

1.5. Special Accessories

Not available for this EUT intended for grant.

1.6. Equipment Modifications

Not available for this EUT intended for grant.

2. System Test Configuration

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The Transmitter was operated in the normal operating mode. the Tx frequency was fixed and continuous which was for the purpose of the measurements.

2.3. Test Procedure

2.3.1 Conducted Emissions (Not apply in the report)

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7.3.1 of ANSI C63.4-2009.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter(EUT) was rotated through three orthogonal axes according to the requirements in Section 8 and 13 of ANSI C63.4-2009.

2.4. Limitation

(1) Conducted Emission

According to section 15.207(a) Conducted Emission Limits is as following.

Frequency range MHz	Limits dB (uV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Note 1.The lower limit shall apply at the transition frequencies 2.The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

(2) Radiated Emission

(a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

(b) In the emission table above, the tighter limit applies at the band edges.

(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other Sections within this Part and which are required to reduce their nwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Frequency (MHz)	Field strength μV/m	Distance (m)	Field strength at 3m dBμV/m
0.009-0.490	2400/F(KHz)	300	
0.490-1.705	24000/F(KHz)	30	
1.705-30	30	30	69.54
30-88	100	3	40
88-216	150	3	43.5
216-960	200	3	46
Above 960	500	3	54

Limit Table:

Frequency kHz	Distance m	Limit at 300m dBμV/m	Limit at 30m dBμV/m	Distance Factor dB	Limit dBμV/m at 3m
125	300	25.67	---	80	105.67
250	300	19.65	---	80	99.65
375	300	16.12	---	80	96.12
500	30	---	33.62	40	73.62
625	30	---	31.69	40	71.69
750	30	---	30.10	40	70.10
875	30	---	28.76	40	68.76
1000	30	---	27.60	40	67.60
1125	30	---	26.58	40	66.58
1250	30	---	25.67	40	65.67

Limit Calculation and transfer to 1m test distance:

If the frequency between 9 – 490KHz,
Limit = 20log(2400/f(KHz) + 40log(300/3)

If the frequency between 490 KHz – 1.705MHz
Limit = 20log(24000/f(KHz) + 40log(30/3)

2.5. Configuration of Tested System

Fig. 2-1 Configuration of Tested System

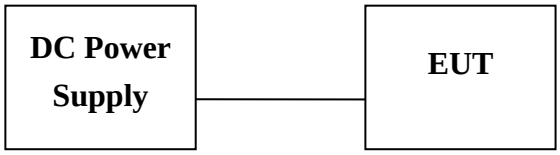


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1	DC Power Supply	Tapward	3303D	981327	shielding	Un-shielding

3. Summary of Test Results

FCC Rules	Description Of Test	Result
§15.207	Conducted Emission	N/A*
§15.209	Radiated Emission	Compliant

4. Description of test modes

The EUT has been tested under continuous operating condition. The Frequency 125kHz was chosen for testing.

This UE is not capable of being powered by Public Utility (AC). Conducted Emission Test is excluded.

5. MEASUREMENT UNCERTAINTY FOR FIELD STRENGTH OF SPURIOUS RADIATION

Measurement uncertainty (Polarization : **Vertical**)	30MHz - 180MHz: 3.37dB
	180MHz -417MHz: 3.19dB
	0.417GHz-1GHz: 3.19dB
	1GHz - 18GHz: 4.04dB
	18GHz - 40GHz: 4.04dB

Measurement uncertainty (Polarization : **Horizontal**)	30MHz - 167MHz: 4.22dB
	167MHz -500MHz: 3.44dB
	0.5GHz-1GHz: 3.39dB
	1GHz - 18GHz: 4.08dB
	18GHz - 40GHz: 4.08dB

6. Conducted Emissions Test

6.1. Measurement Procedure:

1. The EUT was placed on a table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. Repeat above procedures until all frequency measured were complete.

6.2. Test SET-UP (Block Diagram of Configuration)

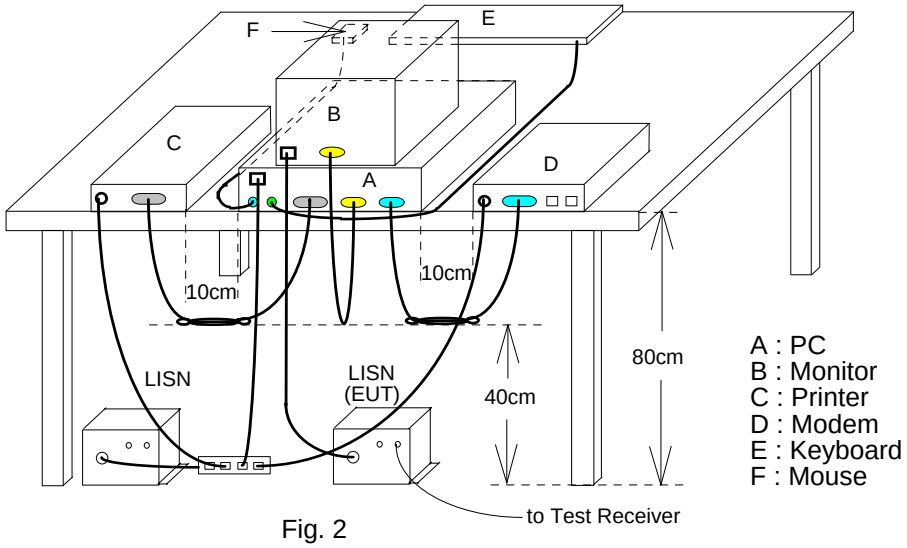


Fig. 2

6.3. Measurement Equipment Used:

Conducted Emission Test Site					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESCI7	100759	05/20/2011	05/19/2013
EMI Receiver	R&S	ESCS 30	828985/004	09/23/2012	09/22/2013
LISN	Rolf-Heine	NNB-2/16Z	99012	03/23/2012	03/22/2013
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	03/23/2012	03/22/2013
Coaxial Cables	N/A	WK CE Cable	N/A	01/05/2013	01/04/2014

6.4. Measurement Result:

N/A. EUT powered from DC 12V.

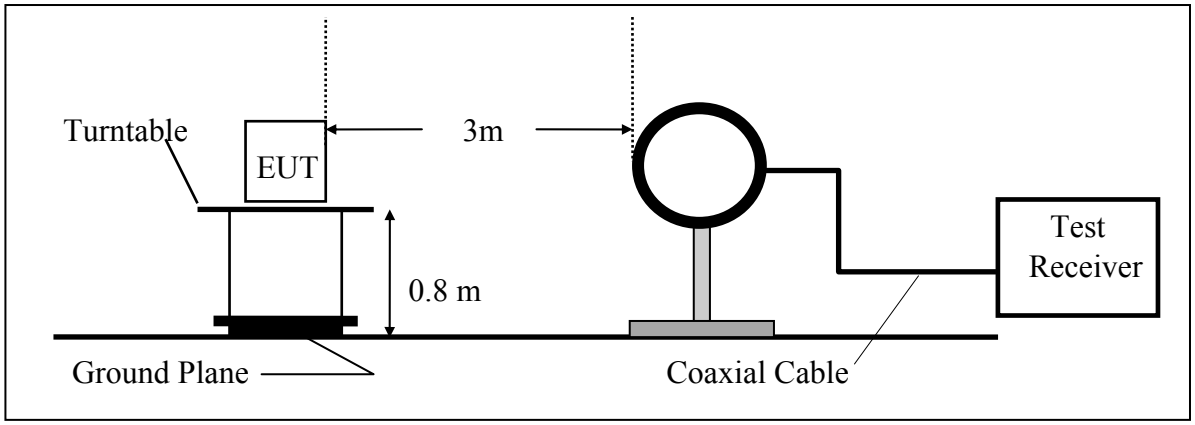
7. Radiated Emission Test

7.1. Measurement Procedure

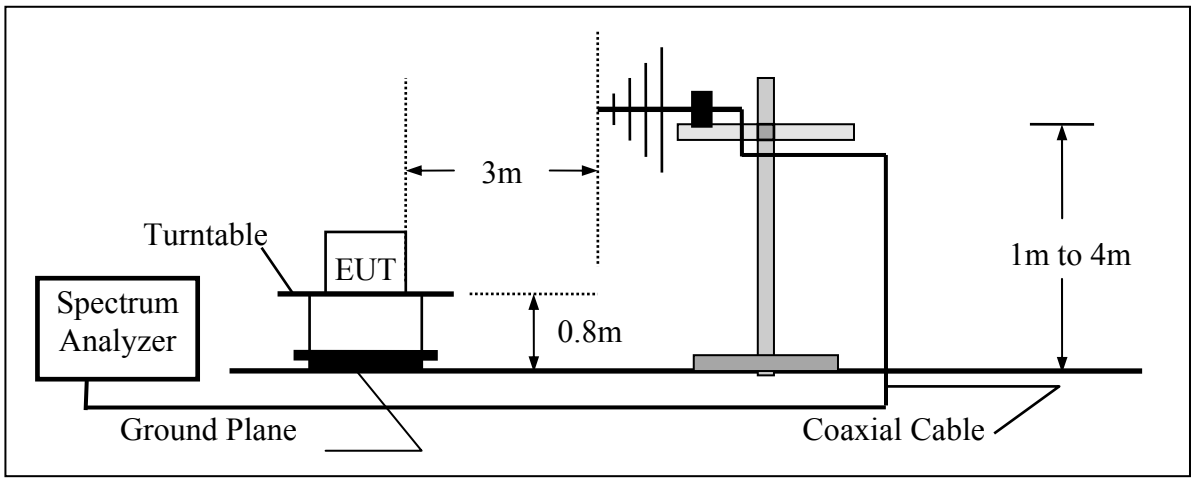
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measured were complete.

7.2. Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency Below 1000MHz



7.3. Measurement Equipment Used:

966 Chamber					
EQUIPMENT TYPE	**MFR**	**MODEL NUMBER**	**SERIAL NUMBER**	**LAST CAL.**	**CAL DUE.**
EMI Test Receiver	R&S	ESCI7	100759	05/20/2011	05/19/2013
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/15/2011	04/14/2013
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	02/06/2013	02/07/2014
Spectrum Analyzer	R&S	FSV-30	101398	10/18/2011	10/17/2013
Bilog Antenna	SCHWAZBECK	VULB9168	378	01/10/2012	01/09/2014
Horn antenna	ETS.LINDGREN	3117	123995	05/19/2011	05/18/2013
Horn Antenna	Schwarzbeck	BBHA9170	185	07/11/2011	07/10/2013
Pre-Amplifier	Agilent	8447D	2944A07676	01/04/2013	01/03/2014
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/04/2013	01/03/2014
Filter 2400-2483.5 MHz	EWT	EWT-14-0166	M2	02/28/2012	02/28/2013
Attenuator	Mini-Circuit	BW-S10W2+	004	02/28/2012	02/27/2013
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R
Controller	HD	HD100	N/A	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_Rx	9	01/04/2013	01/03/2014
3m Site NSA	SGS	966 chamber	N/A	07/15/2012	07/14/2013

7.4. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

7.5. Measurement Result

Operation Band	:125 KHz	Test Date	:2012-10-29
Fundamental Frequency	:125 KHz	Temp./Humi.	:25.1deg_C/70RH
Operation Mode	:TX	Engineer	:Marcus
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
0.125	F	Peak	81.30	12.04	93.34	105.33	-11.99
0.250	H	---					
0.375	H	---					
0.500	H	---					
0.625	H	---					
0.750	H	---					
0.875	H	---					
1.000	H	---					
1.125	H	---					
1.250	H	---					
3.390	S	Peak	38.88	11.78	50.66	69.54	-18.88
8.770	S	Peak	22.53	11.28	33.81	69.54	-35.73
14.240	S	Peak	18.54	10.64	29.18	69.54	-40.36
17.920	S	Peak	16.07	10.60	26.67	69.54	-42.87
21.360	S	Peak	16.78	10.13	26.91	69.54	-42.63
28.090	S	Peak	16.62	9.06	25.68	69.54	-43.86

Operation Band	:125 KHz	Test Date	:2012-10-29
Fundamental Frequency	:125 KHz	Temp./Humi.	:25.1deg_C/70RH
Operation Mode	:TX	Engineer	:Marcus
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
0.125	F	Peak	83.21	12.04	95.25	105.33	-10.08
0.250	H	---					
0.375	H	---					
0.500	H	---					
0.625	H	---					
0.750	H	---					
0.875	H	---					
1.000	H	---					
1.125	H	---					
1.250	H	---					
3.660	S	Peak	36.85	11.73	48.58	69.54	-20.96
7.070	S	Peak	22.30	11.43	33.73	69.54	-35.81
10.210	S	Peak	21.38	11.16	32.54	69.54	-37.00
18.250	S	Peak	15.05	10.58	25.63	69.54	-43.91
21.480	S	Peak	15.95	10.11	26.06	69.54	-43.48
25.810	S	Peak	13.61	9.49	23.10	69.54	-46.44

Operation Band	:125 KHz	Test Date	:2012-10-29
Fundamental Frequency	:125 KHz	Temp./Humi.	:25.1deg_C/70RH
Operation Mode	:TX	Engineer	:Marcus
EUT Pol.	:H Plan	Measurement Antenna Pol.	:VERTICAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
"E" : denotes Band Edge Frequency. ; "S" : denotes Spurious Frequency.
"---" : denotes Noise Floor.

Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
40.67	S	Peak	47.45	-13.48	33.97	40.00	-6.03
97.90	S	Peak	50.93	-16.99	33.94	43.50	-9.56
171.62	S	Peak	39.45	-13.37	26.08	43.50	-17.42
479.11	S	Peak	38.77	-9.82	28.95	46.00	-17.05
504.33	S	Peak	39.66	-9.50	30.16	46.00	-15.84
578.05	S	Peak	36.11	-8.03	28.08	46.00	-17.92

Operation Band	:125 KHz	Test Date	:2012-10-29
Fundamental Frequency	:125 KHz	Temp./Humi.	:25.1deg_C/70RH
Operation Mode	:TX	Engineer	:Marcus
EUT Pol.	:H Plan	Measurement Antenna Pol.	:HORIZONTAL

Actual FS(dBμV/m) = SPA. Reading level(dBμV) + Factor(dB)

Factor(dB) = Antenna Factor(dBμV/m) + Cable Loss(dB) – Pre_Amplifier Gain(dB)

Note : "F" : denotes Fundamental Frequency. ; "H" : denotes Harmonic Frequency.
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Freq.	Note	Detector Mode	Spectrum Reading Level	Factor	Actual FS	Limit @3m	Margin
MHz	F/H/E/S	PK/QP/AV	dBμV	dB	dBμV/m	dBμV/m	dB
40.67	S	Peak	45.88	-13.48	32.40	40.00	-7.60
97.90	S	Peak	52.15	-16.99	35.16	43.50	-8.34
196.84	S	Peak	44.77	-15.97	28.80	43.50	-14.70
304.51	S	Peak	40.38	-12.45	27.93	46.00	-18.07
368.53	S	Peak	40.25	-11.45	28.80	46.00	-17.20
707.06	S	Peak	29.92	-5.64	24.28	46.00	-21.72