FCC EMI TEST REPORT

FCC ID	**:**	**LHJ-FE4NA0210**
Equipment	**:**	**FE4NA0210**
Brand Name	**:**	**Continental**
Model Name	**:**	**FE4NA0210**
Applicant	**:**	**Continental Automotive Systems, Inc. 21440 W Lake Cook Rd.**
Manufacturer	**:**	**Continental Automotive Systems, Inc. 21440 W Lake Cook Rd.**
Standard	**:**	**FCC 47 CFR FCC Part 15 Subpart B Class B**

The product was received on Apr. 19, 2021 and testing was started from Apr. 26, 2021 and completed on Apr. 27, 2021. We, Sporton International Inc. Wensan Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4-2014 and has been in compliance with the applicable technical standards.

The test results in this variant report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory
No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issued Date
FC031205-01	01	Initial issue of report	May 07, 2021

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	15.107	AC Conducted Emission	Not Required	-
3.1	15.109	Radiated Emission	Pass	Under limit 13.84 dB at 954.410 MHz

Note:

1. Not required means after assessing, test items are not necessary to carry out.
2. This is a variant report which can be referred to change list. All the test cases were performed on original report which can be referred to Sporton Report Number FC031205. Based on the original report, the test cases were verified.

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Dara Chiu

Report Producer: Tina Chuang

1. General Description

1.1. Product Feature of Equipment Under Test

Product Feature	
Equipment	FE4NA0210
Brand Name	Continental
Model Name	FE4NA0210
FCC ID	LHJ-FE4NA0210
EUT supports Radios application	WCDMA/HSPA/LTE/GNSS
HW Version	P4
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer.

1.2. Product Specification of Equipment Under Test

Product Specification subjective to this Test Standard	
Tx Frequency	WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band IV : 1712.4 MHz ~ 1752.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 5 : 824.7 MHz ~ 848.3 MHz LTE Band 12 : 699.7 MHz ~ 715.3 MHz LTE Band 13 : 779.5 MHz ~ 784.5 MHz LTE Band 14 : 790.5 MHz ~ 795.5 MHz LTE Band 66: 1710.7 MHz ~ 1779.3 MHz
Rx Frequency	WCDMA Band V: 871.4 MHz ~ 891.6 MHz WCDMA Band IV: 2112.4 MHz ~ 2152.6 MHz WCDMA Band II: 1932.4 MHz ~ 1987.6 MHz LTE Band 2 : 1930.7 MHz ~ 1989.3 MHz LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz LTE Band 5 : 869.7 MHz ~ 893.3 MHz LTE Band 12 : 729.7 MHz ~ 745.3 MHz LTE Band 13 : 748.5 MHz ~ 753.5 MHz LTE Band 14 : 760.5 MHz ~ 765.5 MHz LTE Band 29 : 718.5 MHz ~ 726.5 MHz LTE Band 30 : 2352.5 MHz ~ 2357.5 MHz LTE Band 66: 2110.7 MHz ~ 2199.3 MHz GNSS : 1.57542 GHz; 1176.45 MHz (GPS / Glonass / BDS / Galileo / SBAS)

Product Specification subjective to this Test Standard	
Antenna Type	Fixed External Antenna Antenna Model name: SPDA24700/2700 Antenna Manufactory: Pulse electronics
Antenna Gain	698-960 MHz : 2dBi 1710-2170 MHz : 2dBi 2500-2700MHz : 2dBi
Type of Modulation	WCDMA: QPSK (Uplink) HSDPA: 64QAM (Downlink) HSUPA : QPSK (Uplink) LTE: QPSK / 16QAM / 64QAM GNSS: BPSK

Remark: The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

1.3. Modification of EUT

No modifications are made to the EUT during all test items.

1.4. Test Location

Test Site	Sporton International Inc. Wensan Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH10-HY

FCC designation No.: TW1132

1.5. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC 47 CFR FCC Part 15 Subpart B Class B
- ANSI C63.4-2014

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2. Test Configuration of Equipment Under Test

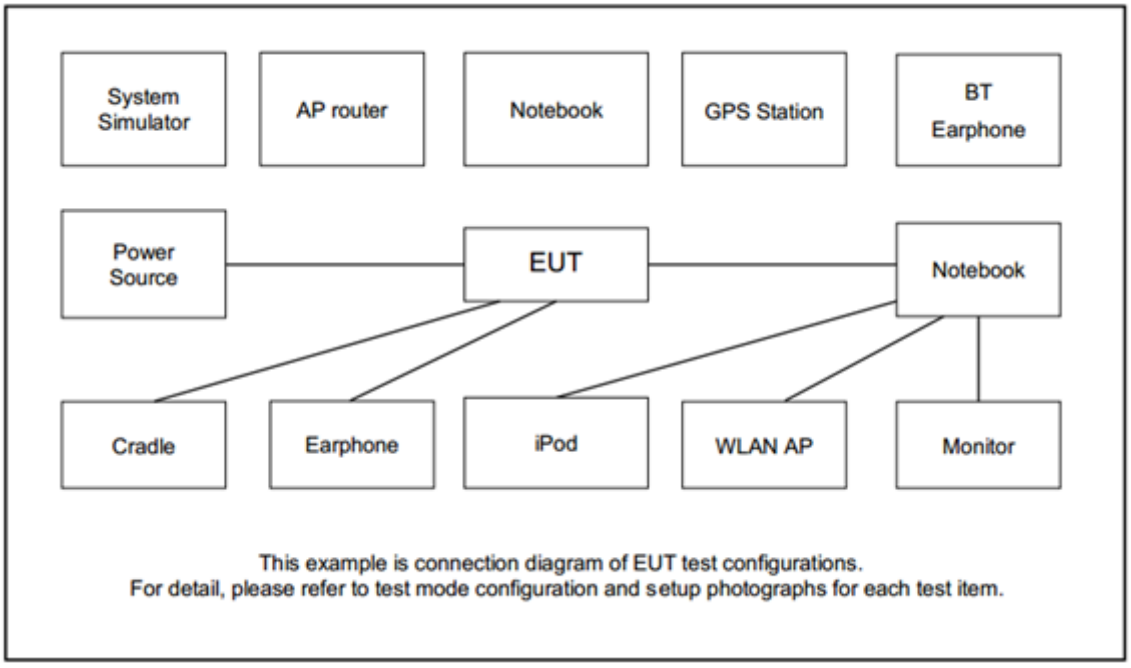
2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: radiation emission (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Function Type
Radiated Emissions	Mode 1 : LTE Band 5 Idle + AC Adapter
Remark: For radiation emission after pre-scanned the cellular band between 30MHz ~ 960MHz (LTE Band 5); only the worst case for cellular band test data of this mode was reported.	

2.2. Connection Diagram of Test System



2.3. Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	Dipole Antenna	Larsen	SPDA24700/2700	N/A	N/A	N/A
3.	Adapter	Qualtek	ATS018T-W120U	N/A	N/A	N/A

2.4. EUT Operation Test Setup

The EUT was in LTE idle mode during the testing. The EUT was synchronized with the BCCH, and had been continuous receiving mode by setting paging reorganization of the system simulator.

3. Test Result

3.1. Test of Radiated Emission Measurement

3.1.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

<Class B>

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.1.2. Measuring Instruments

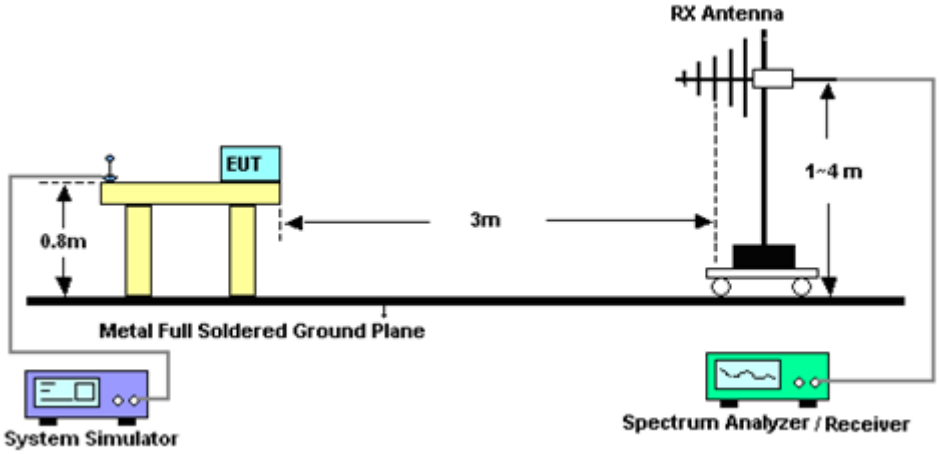
Refer a test equipment and calibration data table in this test report.

3.1.3. Test Procedures

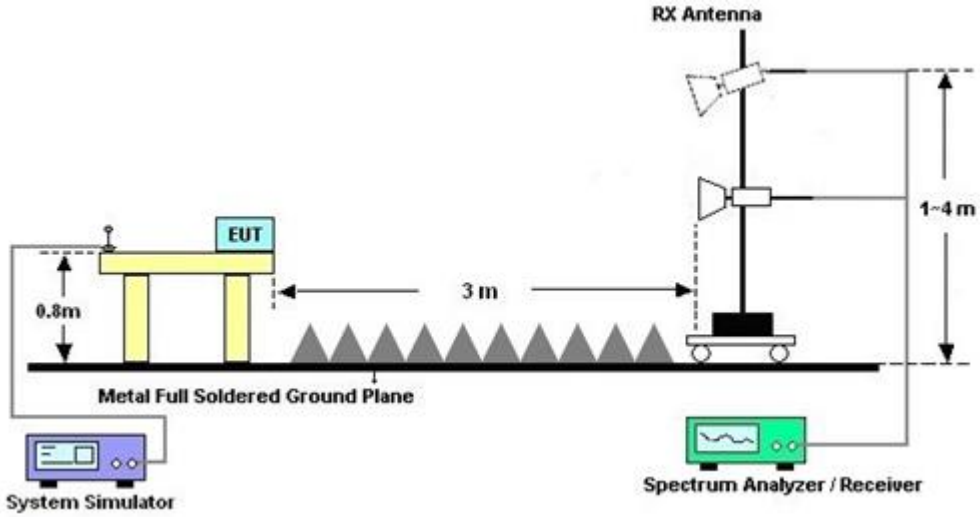
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120 kHz/VBW=300 kHz for frequency below 1 GHz; RBW=1 MHz VBW=3 MHz (Peak), RBW=1 MHz/VBW=10 Hz (Average) for frequency above 1 GHz).
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dBμV/m) = 20 log Emission level (μV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.1.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.1.5. Test Result of Radiated Emission

Please refer to Appendix A.

4. List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Oct. 21, 2020	Apr. 26, 2021~ Apr. 27, 2021	Oct. 20, 2021	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	35413 & 02	30MHz~1GHz	Feb. 10, 2021	Apr. 26, 2021~ Apr. 27, 2021	Feb. 09, 2022	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-02114	1GHz~18GHz	Aug. 04, 2020	Apr. 26, 2021~ Apr. 27, 2021	Aug. 03, 2021	Radiation (03CH10-HY)
Preamplifier	Jet-Power	JAP00101800-30-10P	160118550004	1GHz~18GHz	Mar. 01, 2021	Apr. 26, 2021~ Apr. 27, 2021	Feb. 28, 2022	Radiation (03CH10-HY)
Spectrum Analyzer	Keysight	N9010A	MY53470118	10Hz~44GHz	Jan. 15, 2021	Apr. 26, 2021~ Apr. 27, 2021	Jan. 14, 2022	Radiation (03CH10-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Apr. 26, 2021~ Apr. 27, 2021	N/A	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Apr. 26, 2021~ Apr. 27, 2021	N/A	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0~360 Degree	N/A	Apr. 26, 2021~ Apr. 27, 2021	N/A	Radiation (03CH10-HY)
Software	Audix	E3 6.2009-8-24	RK-001042	N/A	N/A	Apr. 26, 2021~ Apr. 27, 2021	N/A	Radiation (03CH10-HY)
EMI Test Receiver	Agilent	N9038A (MXE)	MY55420170	20MHz~8.4GHz	May 21, 2020	Apr. 26, 2021~ Apr. 27, 2021	May 20, 2021	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104 / 102	MY11692/4PE, MY11693/4PE, MY2855/2	30MHz~1GHz	Nov. 06, 2020	Apr. 26, 2021~ Apr. 27, 2021	Nov. 05, 2021	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104 / 102	MY11692/4PE, MY11693/4PE, MY2855/2	1GHz~18GHz	Nov. 06, 2020	Apr. 26, 2021~ Apr. 27, 2021	Nov. 05, 2021	Radiation (03CH10-HY)

5. Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

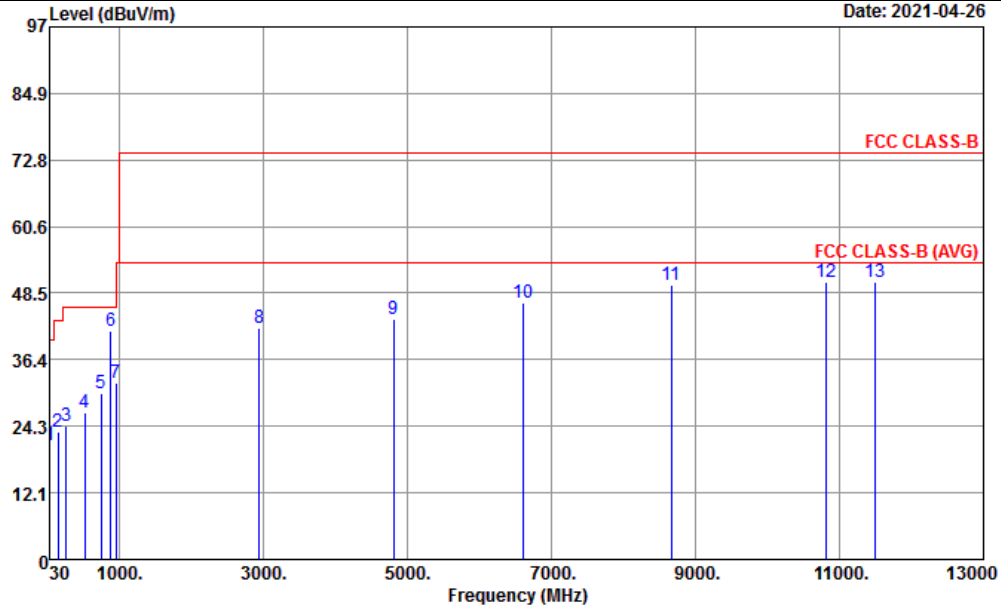
Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.7**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.1**

Appendix A. Radiated Emission Test Result

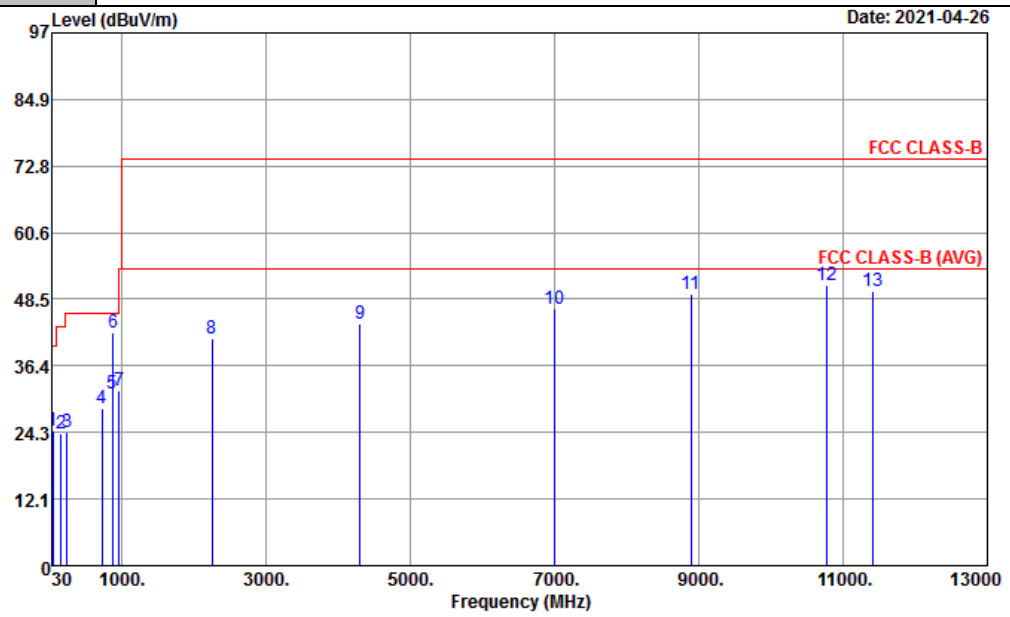
Test Engineer :	Johnny Hsieh	**Temperature :**	22.5~23.7°C
		Relative Humidity :	55.8~56.8%
Test Distance :	3m	**Polarization :**	Horizontal
Remark :	#6 is system simulator signal which can be ignored.		



Site : 03CH10-HY
Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL
Project : 031205-01
Power : 120Vac/60Hz
Mode : 1

	Freq	Level	Over Limit	Limit Line	Antenna Factor	Read Level	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dBuV	dB	dB	cm	deg	
1	30.00	20.85	-19.15	40.00	24.38	28.49	0.63	32.65	---	---	Peak
2	143.49	23.37	-20.13	43.50	17.22	37.35	1.35	32.55	---	---	Peak
3	265.71	24.35	-21.65	46.00	19.63	35.34	1.83	32.45	---	---	Peak
4	524.70	26.62	-19.38	46.00	23.90	32.62	2.58	32.48	---	---	Peak
5	751.68	30.38	-15.62	46.00	28.57	31.15	3.08	32.42	---	---	Peak
6	881.50	41.52			28.90	41.15	3.33	31.86	---	---	Peak
7	954.41	32.16	-13.84	46.00	30.89	28.96	3.49	31.18	100	0	Peak
8	2940.00	42.15	-31.85	74.00	28.26	65.56	6.46	58.13	---	---	Peak
9	4812.00	43.69	-30.31	74.00	31.00	62.56	8.59	58.46	---	---	Peak
10	6606.00	46.64	-27.36	74.00	34.29	61.35	10.53	59.53	---	---	Peak
11	8668.00	50.12	-23.88	74.00	37.37	60.70	11.87	59.82	---	---	Peak
12	10804.00	50.49	-23.51	74.00	39.81	56.41	13.36	59.09	---	---	Peak
13	11500.00	50.59	-23.41	74.00	39.70	55.60	13.91	58.62	100	0	Peak

Test Engineer :	Johnny Hsieh	**Temperature :**	22.5~23.7°C
		Relative Humidity :	55.8~56.8%
Test Distance :	3m	**Polarization :**	Vertical
Remark :	#6 is system simulator signal which can be ignored.		



Site : 03CH10-HY
Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL
Project : 031205-01
Power : 120Vac/60Hz
Mode : 1

	Freq	Level	Over Limit	Limit Line	Antenna Factor	Read Level	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dBuV	dB	dB	cm	deg	
1	42.61	24.54	-15.46	40.00	18.07	38.36	0.75	32.64	---	---	Peak
2	161.92	24.13	-19.37	43.50	16.22	39.00	1.44	32.53	---	---	Peak
3	245.34	24.41	-21.59	46.00	17.71	37.41	1.75	32.46	---	---	Peak
4	730.34	28.57	-17.43	46.00	27.88	30.11	3.03	32.45	---	---	Peak
5	868.08	31.33	-14.67	46.00	29.13	30.83	3.31	31.94	---	---	Peak
6	881.50	42.29			28.90	41.92	3.33	31.86	---	---	Peak
7	958.29	31.75	-14.25	46.00	31.02	28.38	3.49	31.14	100	0	Peak
8	2250.00	41.24	-32.76	74.00	27.80	66.10	5.52	58.18	---	---	Peak
9	4308.00	44.11	-29.89	74.00	29.93	64.51	8.13	58.46	---	---	Peak
10	6990.00	46.81	-27.19	74.00	35.16	60.17	11.15	59.67	---	---	Peak
11	8894.00	49.56	-24.44	74.00	37.51	60.02	12.16	60.13	---	---	Peak
12	10770.00	50.95	-23.05	74.00	39.71	57.07	13.33	59.16	100	0	Peak
13	11408.00	50.01	-23.99	74.00	39.61	55.20	13.83	58.63	---	---	Peak