FCC PART 101 TYPE APPROVALS
EMI MEASUREMENT AND TEST REPORT

For

ComoTech Corporation

1-908, Ulsan APT-Bldg.,
812-1, Hyomun-Dong, Buk-Gu,
Ulsan City, 683-360 Korea

FCC ID: RL3- ALTE1000

This Report Concerns:	Equipment Type:
☒ Original Report	Millimeter wave radio communication system

Test Engineer: Snell Leong

Report No.: R0512154

Report Date: 2006-1-26

Reviewed By: James Ma

Prepared By: Bay Area Compliance Laboratory Corporation (BACL)
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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *ComoTech Corporation.'s* product, FCC ID: RL3- ALTE1000 or the "EUT" as referred to in this report is a Millimeter wave radio communication system, which measures approximately 12inchL x 8 inchW x 12 inchH.and operating at 71.5 or 74.9 Ghz.

** The test data gathered are from typical production sample, serial number: S0520511003 provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *ComoTech Corporation* in accordance with Part 2, Subpart J, Part 101 Subpart Q of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for RF output power, occupied bandwidth, field strength of spurious radiation.

Related Submittal(s)/Grant(s)

No Related Submittals

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 101 Subpart Q SERVICE AND TECHNICAL RULES FOR THE 70/80/90 GHZ BANDS

Applicable Standards: TIA EIA 98-C, TIA603-C, ANSI C63.4-2003.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 or 1 meters.

Test Facility

The Open Area Test site used by BACL Corp. to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA with registration number: 90464.

Test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the test methods and procedures set forth in ANSI C63.4-2003& TIA/EIA-603.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations is attached hereinafter and can also be found at
http://ts.nist.gov/ts/htdocs/210/214/scopes/2001670.htm

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA/EIA-603 C.

The final qualification test was performed with the EUT operating at normal mode.

Block Diagram

Please refer to Exhibit D.

Equipment Modifications

No modifications were made to the EUT.

SUMMARY OF TEST RESULTS

FCC RULE	DESCRIPTION OF TEST	RESULT
§ 2.1047 § 101.141	Modulation Characteristics	No Requirement
§ 2.1053 § 101.111	Field Strength of Spurious Radiation	Compliant
§2.1093 § 101.1525	RF Exposure	Compliant
§ 2.1046, § 101.113	RF Output Power	Compliant
§ 2.1049 § 101.109	Occupied Bandwidth	Compliant
§ 2.1055 (a) § 2.1055 (d) § 101.107	Frequency stability vs. temperature Frequency stability vs. voltage	No Requirement

§2.1047 §101.141 - MODULATION CHARACTERISTIC

Applicable Standard

Requirement: FCC § 2.1047(d). As Part 101.141, There is no requirement for transmitter operating at 70 Ghz.

§2.1053 / §101.111- HARMONIC & SPURIOUS EMISSIONS

Applicable Standard

Requirements: CFR 47, § 2.1053 / §101.111 (2)(ii)

For operating frequencies above 15 GHz, In any 1 MHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 Log_{10} (the mean output power in watts) decibels, or 80 decibels, whichever is the lesser attenuation. The authorized bandwidth includes the nominal radio frequency bandwidth of an individual transmitter/modulator in block-assigned bands. Equipment licensed prior to April 1, 2005 shall only be required to meet this standard in any 4 kHz band.

For EIRP=52dBm , which is equivalent = 156.77 dBuV/m @ 1 meter or 147.23 dBuV/m @ 3 meter.
A = 43 + 22 dBW = 65 dBc .
Emission Limit = 91.77 dBuV/m @ 1 meter or 82.23 dBuV/m.@ 3 meter

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into antenna which was also placed on the turntable.

The measurement antenna was placed at a distance of 1 or 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up 200 Ghz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
OML	WR-12 harmonic Mixer with Horn antenna	M12HW/A	E60120-1	1/23/2006
OML	WR-05 Harmonic Mixer with Horn Antenna	M05HW/A	G60106-1	1/23/2006
OML	WR-03 Harmonic Mixer with Horn Antenna	M03HWD	H60120-1	1/23/2006
OML	Diplexer for Agilent Spectrum Analyzer	DPL26	N/A	N/A
HP	Pre, Amplifier (1 ~ 26.5 GHz)	8449B	3147A00400	5-Oct-05
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2005
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	4/20/2005

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	18° C
Relative Humidity:	55%
ATM Pressure:	1020mbar

** The testing was performed by Snell Leong on 2006-01 -26.*

Test Result
Worst case reading as follows:
-33.2 dB at 131.7 MHz
-35.2 dB at 41.2 Mhz

Final scan 1GHz -200GHz , Fundamental = 71.5 Ghz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Distance Factor dB	Correction Factor dBuV/m	101.111 Limit (dBuV/m)	Margin dB
1947.20	53.9	270	2.4	v	24.8	1.9	36.3	10.0	34.2	91.77	-57.6
1947.20	48.6	180	2.2	h	24.8	1.9	36.3	10.0	28.9	91.77	-62.9
2404.00	56.4	270	2.4	v	28.7	2.0	35.8	10.0	41.2	91.77	-50.5
2404.00	50.1	180	2.2	h	28.7	2.0	35.8	10.0	34.9	91.77	-56.9
4080.00	47.8	270	2.4	v	31.8	2.9	34.7	10.0	37.8	91.77	-54.0
4080.00	42.1	180	2.2	h	31.8	2.9	34.7	10.0	32.1	91.77	-59.7
143000.00	67.5	0	1.5	v	24.0	8.8	0.0	29.5	70.8	91.77	-21.0
143000.00	61.3	0	1.5	h	24.0	8.8	0.0	29.5	64.6	91.77	-27.2

Final scan 1GHz -200GHz , Fundamental = 74.9 Ghz)

Frequency MHz	Reading dBuV/m	Direction Degree	Height Meter	Polar H / V	Antenna Loss dB	Cable loss dB	Amplifier dB	Distance Factor dB	Correction Factor dBuV/m	101.111 Limit (dBuV/m)	Margin dB
1947.50	58.1	270	2.4	v	24.8	1.9	36.3	10.0	38.4	91.77	-53.4
1947.50	51.3	180	2.2	h	24.8	1.9	36.3	10.0	31.6	91.77	-60.2
2071.30	60.3	270	2.4	v	28.7	2.0	35.8	10.0	45.1	91.77	-46.7
2071.30	51.2	180	2.2	h	28.7	2.0	35.8	10.0	36.0	91.77	-55.8
4142.70	47.8	270	2.4	v	31.8	2.9	34.7	10.0	37.8	91.77	-54.0
4142.70	42.1	180	2.2	h	31.8	2.9	34.7	10.0	32.1	91.77	-59.7
149800.00	66.8	0	1.5	v	24.0	8.8	0.0	29.5	70.1	91.77	-21.7
149800.00	61.1	0	1.5	h	24.0	8.8	0.0	29.5	64.4	91.77	-27.4

Final scan 30MHz -1GHz , Fundamental = 71.5Ghz

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifer	Correction Factor	101.11	
MHz	dBuV	Degree	Meter	H / V	dB	dB	dB	dBuV	Limit	Margin
78.20	61.7	270	3.2	H	8.2	1.8	28.4	43.3	82.23	-38.9
78.20	52.3	75	1.8	V	8.2	1.8	28.4	33.9	82.23	-48.3
217.20	50.1	270	2.1	H	10.6	3.1	27.6	36.2	82.23	-46.0
217.20	42.6	330	1.2	V	10.6	3.1	27.6	28.7	82.23	-53.5
41.20	60.3	280	2.8	H	13.9	1.4	28.6	47.0	82.23	-35.2
41.20	52.8	250	1.0	V	13.9	1.4	28.6	39.5	82.23	-42.7

Final scan 30MHz -1GHz , fundamental = 74.9 Ghz

Frequency	Reading	Direction	Height	Polar	Antenna Loss	Cable loss	Amplifer	Correction Factor	101.11	
MHz	dBuV	Degree	Meter	H / V	dB	dB	dB	dBuV	Limit	Margin
59.20	65.6	270	3.2	H	7.3	1.6	28.5	46.0	82.23	-36.2
59.20	51.3	75	1.8	V	7.3	1.6	28.5	31.7	82.23	-50.5
131.70	60.8	270	2.1	H	14.1	2.4	28.3	49.0	82.23	-33.2
131.70	53.4	330	1.2	V	14.1	2.4	28.3	41.6	82.23	-40.6
219.40	57.3	280	2.8	H	10.6	3.1	27.6	43.4	82.23	-38.8
219.40	52.1	250	1.0	V	10.6	3.1	27.6	38.2	82.23	-44.0

§2.1046, §101.113 – Transmitter Power Limitation

Applicable Standard

Frequency band (MHz)	Maximum allowable EIRP \1\ \2\ Fixed \1\ ,\2\ (dBW)	Mobile (dBW)
928.0-929.0(2)	+17	.....
932.0-932.5(2)	+17	.....
932.5-935.0	+40	.....
941.0-941.5(2)	+30	+14
941.5-944.0	+40	.....
952.0-960.0(2)	+40	+14
1,850-1,990	+45	.....
2,110-2,150	+45	.....
2,150-2,180 \3\	+45	.....
2,180-2,200	+45	.....
2,450-2,500	+45	.....
2,500-2,686	.....	.....
2,686-2,690	+45	.....
3,700-4,200	+55	.....
5,925-6,425	+55	.....
6,425-6,525	.....	+35
6,525-6,875	+55	.....
10,550 to 10,600 5	+55	
10,600 to 10,680 5	+40	
10,700-11,700	+55	.....
12,200-12,700 \11\	+50	
12,700-13,200 \4\	+50	.....
13,200-13,250 \4\	+55	.....
14,200-14,400 \12\	+45	.....
17,700-18,600	+55	.....
18,600-18,800 \6\	+35	.....
18,800-19,700	\5\ +55	.....
21,200-23,600 \10\	+55	.....
24,250-25,250	\5\ +55	.....
27,500-28,350 \9\	+55	.....
29,100-29,250	(\7\)	.....
31,000 to 31,075 8, 9	30 dBW/MHz	30 dBW/MHz
31,075 to 31,225 8, 9	30 dBW/MHz	30 dBW/MHz
31,225 to 31,300 8, 9	30 dBW/MHz	30 dBW/MHz
38,600-40,000	+55	.....
92,000-95,000	+55	+55

Test Procedure

Conducted:

The RF output of the transmitter was connected to the spectrum analyzer through sufficient attenuation.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
WR-12 harmonic Mixer with Horn antenna	M12HW/A	E60120-1	1/23/2006	WR-12 harmonic Mixer with Horn antenna
Diplexer for Agilent Spectrum Analyzer	DPL26	N/A	N/A	Diplexer for Agilent Spectrum Analyzer
Analyzer, Spectrum	E4446A	US44300386	11/10/2005	Analyzer, Spectrum

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	19° C
Relative Humidity:	58%
ATM Pressure:	1018mbar

** The testing was performed by Snell Leong on 2006-01-26.*

Test Results

Frequency GHz	Reading dBm	Conversion loss dB	Antenna Gain dB	Correction Factor dBm	Correction Factor dBW	101.113 limit dBW	15.247 Margin	Comments	Testing Condition
71.5000	-38.5	47.5	43.0	52.0	22.0	55	-33.0	Fund/Peak	CW
74.9000	-38.7	47.5	43.0	51.8	21.8	55	-33.2	Fund/Peak	CW

§2.1049 & §101.109- OCCUPIED BANDWIDTH

Applicable Standard

Frequency band (MHz)	Maximum authorized bandwidth
928 to 929	25 kHz 1 5 6
932 to 932.5, 941 to 941.5	12.5 kHz 1 5 6
932.5 to 935, 941.5 to 944	200 kHz \1\
952 to 960	200 KHz 1 5 6
1,850 to 1,990	10 MHz \1\
2,110 to 2,130	3.5 MHz
2,130 to 2,150	800 or 1600 KHz \1\
2,150 to 2,160	10 MHz
2,160 to 2,180	3.5 MHz
2,180 to 2,200	800 or 1600 KHz \1\
2,450 to 2,483.5	625 KHz \2\
2,483.5 to 2,500	800 KHz
3,700 to 4,200	20 MHz
5,925 to 6,425	30 MHz \1\
6,425 to 6,525	25 MHz
6,525 to 6,875	10 MHz \1\
10,550 to 10,680	5 MHz \1\
10,700 to 11,700	40 MHz \1\
12,200 to 12,700\8\	500 megahertz
13,200 to 13,250	25 MHz
17,700 to 18,140	220 MHz \1\
18,140 to 18,142	2 MHz
18,142 to 18,580	6 MHz
18,580 to 18,820	20 MHz \1\
18,820 to 18,920	10 MHz
18,920 to 19,160	20 MHz \1\
19,160 to 19,260	10 MHz
19,260 to 19,700	220 MHz \1\
21,200 to 23,600	50 MHz \1\ \4\
24,250 to 25,250	40 MHz \7\
27,500 to 28,350	850 MHz
29,100 to 29,250	150 MHz
31,000 to 31,075	75 MHz
31,075 to 31,225	150 MHz
31,225 to 31,300	75 MHz
38,600 to 40,000	50 MHz \7\
71,000 to 76,000	5000 MHz
81,000 to 86,000	5000 MHz
92,000 to 95,000	(\3\)

Test Procedure

The RF output of the transmitter was connected to the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 30 kHz and the 99% bandwidth was recorded.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
WR-12 harmonic Mixer with Horn antenna	M12HW/A	E60120-1	1/23/2006	WR-12 harmonic Mixer with Horn antenna
Diplexer for Agilent Spectrum Analyzer	DPL26	N/A	N/A	Diplexer for Agilent Spectrum Analyzer
Analyzer, Spectrum	E4446A	US44300386	11/10/2005	Analyzer, Spectrum

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

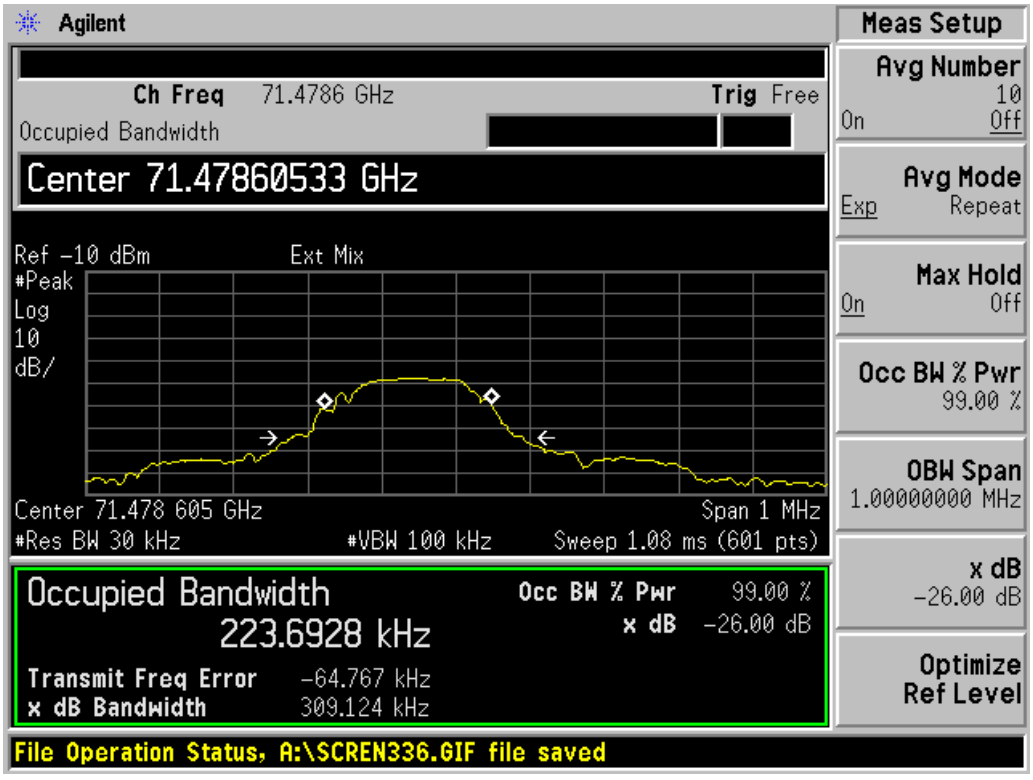
Temperature:	19° C
Relative Humidity:	58%
ATM Pressure:	1018 mbar

** The testing was performed by Snell Leong on 2006-01-26.*

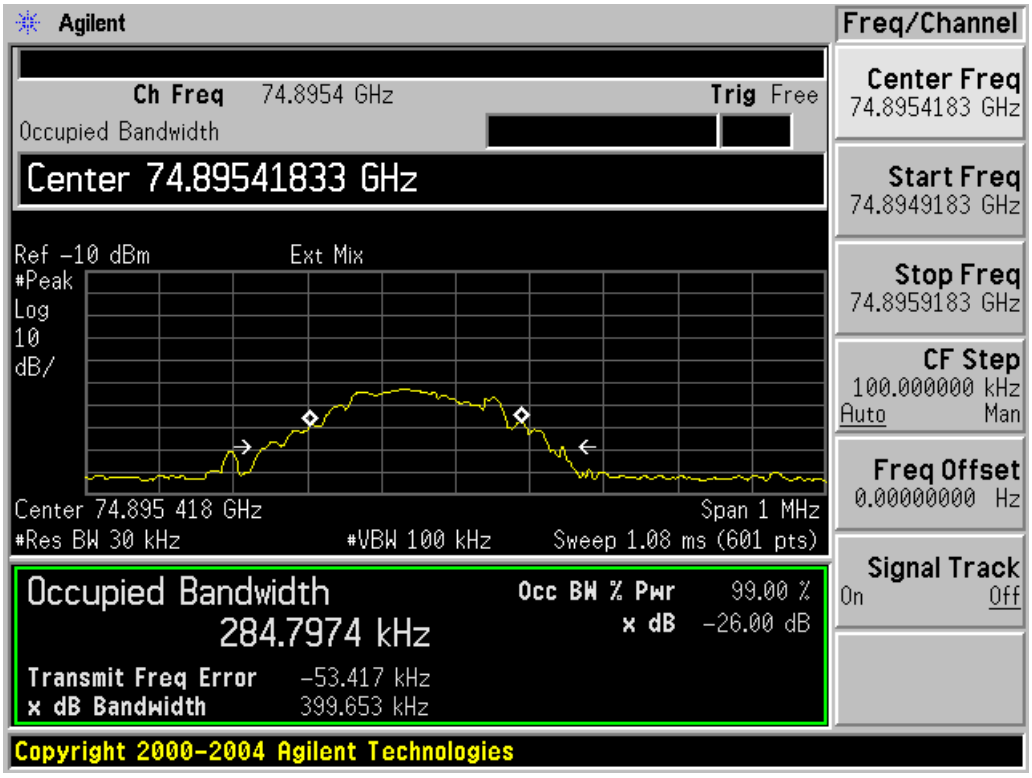
Test Results

Please refer to the following plots.

Plots of Occupied Bandwidth for 71.5 Ghz Transmitter



Plots of Occupied Bandwidth for 74.9 Ghz Transmitter



§2.1055 (a), §2.1055 (d), §101.107- FREQUENCY STABILITY

Applicable Standard

Requirements: FCC § 2.1055 (a), § 2.1055 (d) & 101.107 following:

Per CFR 101.107

Frequency (MHz)	Frequency tolerance (percent)
928 to 929 \5\	0.0005
932 to 932.5	0.00015
932.5 to 935	0.00025
941 to 941.5	0.00015
941.5 to 944	0.00025
952 to 960 \5\	0.0005
1,850 to 1,990	0.002
2,110 to 2,200	0.001
2,450 to 2,500 \1\	0.001
3,700 to 4,200 \1\	0.005
5,925 to 6,875 \1\	0.005
10,550 to 11,700 \1\ \2\	0.005
11,700 to 12,200 \1\	0.005
12,200 to 13,250 \4\	0.005
14,200 to 14,400	0.03
17,700 to 18,820 \3\	0.003
18,820 to 18,920 \3\	0.001
928 to 929 \5\	0.0005
18,920 to 19,700 \3\	0.003
19,700 to 27,500 \4\ \7\	0.001
27,500 to 28,350	0.001
29,100 to 29,250	0.001
31,000 to 31,300 \6\	0.001
31,300 to 40,000 \4\	0.03
71,000 to 76,000 \8\	
81,000 to 86,000 \8\	
92,000 to 95,000 \8\	

There is no requirement for device operating at 71,000 to 76,000 Mhz. However, Test Result is Presented.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
WR-12 harmonic Mixer with Horn antenna	M12HW/A	E60120-1	1/23/2006	WR-12 harmonic Mixer with Horn antenna
Diplexer for Agilent Spectrum Analyzer	DPL26	N/A	N/A	Diplexer for Agilent Spectrum Analyzer
Analyzer, Spectrum	E4446A	US44300386	11/10/2005	Analyzer, Spectrum

*** Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

Environmental Conditions

Temperature:	19° C
Relative Humidity:	58%
ATM Pressure:	1018 mbar

** The testing was performed by Snell Leong on 2006-01-26.*

Please see below for test result:

Temperature	Supply Voltage	Center Frequency	Variation
C	V	Ghz	%
-30	48	71.48622	0.0193
-20	48	71.48995	0.0141
-10	48	71.49144	0.0120
0	48	71.49158	0.0118
10	48	71.49884	0.0016
20	40.8	71.49854	0.0020
20	48	71.49862	0.0019
20	55.2	71.49841	0.0022
30	48	71.49421	0.0081
40	48	71.49237	0.0107
50	48	71.48551	0.0203