

Processing Gain Test for Tsunami (Model 31190)

Test Setup:

The processing gain was measured using the CW jamming margin method as described in 15.247(e)(2). The specific test diagram is illustrated below.

All test equipment and the EUT were allowed to warm up for four hours prior to start of test to minimize drift over time. All test equipment had valid calibration. Calibration of carrier and interferer levels was performed several times during testing with no observed changes.

The measurements were performed on the frequency channel centered at 2461 MHz, over a range of ± 10 MHz. The measurements made across the center ± 7.5 MHz should be used for calculation of G_p since that bandwidth represents the receiver passband.

For the carrier signal, a level approximately 30 dB above threshold was chosen so that thermal noise would not effect the processing gain measurements. The measured threshold of the receive radio was ~ 88 dBm at $BER = 1 \times 10^{-6}$, the signal level of the transmit radio was -50 dBm measured at the input of the receive radio.

For the jammer signal, -45 dBm display reading, P_g , at the generator corresponds to -52.7 dBm (P_j) at the receiver Input. This calibrates the measurement system losses, and therefore, this generator reading is calibrated and therefore can be used for calculating C/I and G_p .

Test Equipment:

Signal Generator	Hewlett Packard 38371A
Power Meter	HP437B/8484A
BER Test Set	Fireberd 6000

Explanation of Results:

The following notations are used on the spreadsheet data:

P_g: Power at Generator in dBm (as indicated by generator display).

P_j: Power of interferer at the receiver input.(calculated in spreadsheet)

P_s: Power of carrier at receiver input (initial calibration).

J/S: Jammer to Signal ratio, $P_j - P_s$ (dB) (calculated in spreadsheet)

G_p: Processing Gain: $(S/N)_o + J/S + L_{sys}$ where:

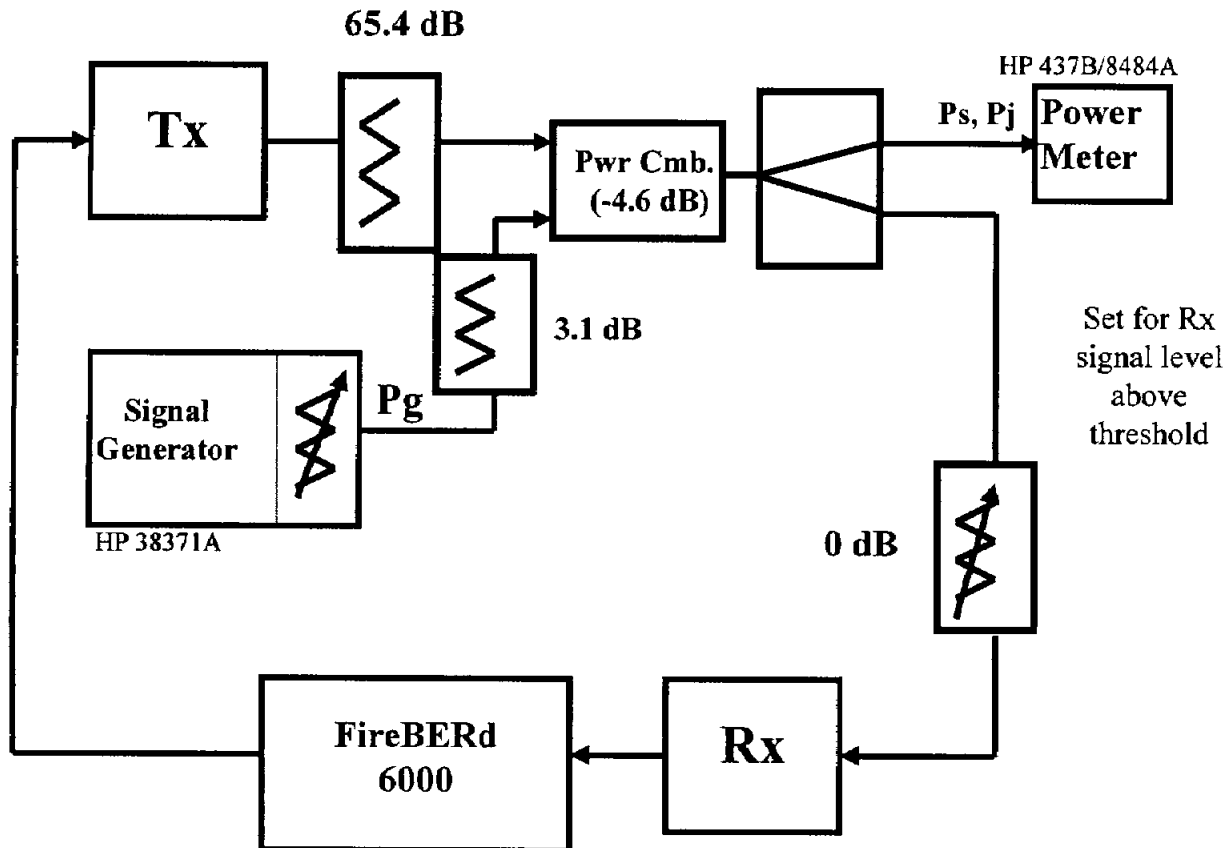
$L_{sys} = 2$ dB

$(S/N)_o = 13.5$ dB for QPSK and $BER = 10^{-6}$ (see curve provided)

therefore: $G_p = 13.5 + 2 + J/S = 15.5 + J/S$ (calculated in spreadsheet)

94.7% of measurements meet the minimum processing gain of 10 dB.

Processing Gain Test Equipment Setup



2.4 GHz 12 Mbps Tsunami 10 Processing Gain Measurement
12/3/99

meas #	f MHz	Gp dBm	Pj dBm	Pg dBm	Ps dBm	J/S dB
1	2449	34.55	-30.9	-23.2	-49.95	19.05
2	2449.05	33.55	-31.9	-24.2	-49.95	18.05
3	2449.1	32.25	-33.2	-25.5	-49.95	16.75
4	2449.15	32.15	-33.3	-25.6	-49.95	16.65
5	2449.2	32.25	-33.2	-25.5	-49.95	16.75
6	2449.25	31.35	-34.1	-26.4	-49.95	15.85
7	2449.3	31.25	-34.2	-26.5	-49.95	15.75
8	2449.35	30.85	-34.6	-26.9	-49.95	15.35
9	2449.4	30.25	-35.2	-27.5	-49.95	14.75
10	2449.45	30.35	-35.1	-27.4	-49.95	14.85
11	2449.5	29.95	-35.5	-27.8	-49.95	14.45
12	2449.55	29.45	-36	-28.3	-49.95	13.95
13	2449.6	29.45	-36	-28.3	-49.95	13.95
14	2449.65	28.85	-36.6	-28.9	-49.95	13.35
15	2449.7	28.95	-36.5	-28.8	-49.95	13.45
16	2449.75	28.95	-36.5	-28.8	-49.95	13.45
17	2449.8	28.05	-37.4	-29.7	-49.95	12.55
18	2449.85	27.95	-37.5	-29.8	-49.95	12.45
19	2449.9	28.05	-37.4	-29.7	-49.95	12.55
20	2449.95	27.25	-38.2	-30.5	-49.95	11.75
21	2450	27.15	-38.3	-30.6	-49.95	11.65
22	2450.05	27.05	-38.4	-30.7	-49.95	11.55
23	2450.1	26.25	-39.2	-31.5	-49.95	10.75
24	2450.15	26.35	-39.1	-31.4	-49.95	10.85
25	2450.2	26.45	-39	-31.3	-49.95	10.95
26	2450.25	25.65	-39.8	-32.1	-49.95	10.15
27	2450.3	25.65	-39.8	-32.1	-49.95	10.15
28	2450.35	25.45	-40	-32.3	-49.95	9.95
29	2450.4	25.15	-40.3	-32.6	-49.95	9.65
30	2450.45	25.05	-40.4	-32.7	-49.95	9.55
31	2450.5	24.55	-40.9	-33.2	-49.95	9.05
32	2450.55	24.25	-41.2	-33.5	-49.95	8.75
33	2450.6	24.25	-41.2	-33.5	-49.95	8.75
34	2450.65	23.65	-41.8	-34.1	-49.95	8.15
35	2450.7	23.65	-41.8	-34.1	-49.95	8.15
36	2450.75	23.45	-42	-34.3	-49.95	7.95

37	2450.8	22.75	-42.7	-35	-49.95	7.25
38	2450.85	22.95	-42.5	-34.8	-49.95	7.45
39	2450.9	22.95	-42.5	-34.8	-49.95	7.45
40	2450.95	22.15	-43.3	-35.6	-49.95	6.65
41	2451	22.05	-43.4	-35.7	-49.95	6.55
42	2451.05	22.15	-43.3	-35.6	-49.95	6.65
43	2451.1	21.45	-44	-36.3	-49.95	5.95
44	2451.15	21.45	-44	-36.3	-49.95	5.95
45	2451.2	21.25	-44.2	-36.5	-49.95	5.75
46	2451.25	20.55	-44.9	-37.2	-49.95	5.05
47	2451.3	20.65	-44.8	-37.1	-49.95	5.15
48	2451.35	20.55	-44.9	-37.2	-49.95	5.05
49	2451.4	20.15	-45.3	-37.6	-49.95	4.65
50	2451.45	20.05	-45.4	-37.7	-49.95	4.55
51	2451.5	19.75	-45.7	-38	-49.95	4.25
52	2451.55	19.65	-45.8	-38.1	-49.95	4.15
53	2451.6	19.75	-45.7	-38	-49.95	4.25
54	2451.65	19.15	-46.3	-38.6	-49.95	3.65
55	2451.7	19.05	-46.4	-38.7	-49.95	3.55
56	2451.75	19.05	-46.4	-38.7	-49.95	3.55
57	2451.8	18.55	-46.9	-39.2	-49.95	3.05
58	2451.85	18.45	-47	-39.3	-49.95	2.95
59	2451.9	18.25	-47.2	-39.5	-49.95	2.75
60	2451.95	17.65	-47.8	-40.1	-49.95	2.15
61	2452	17.75	-47.7	-40	-49.95	2.25
62	2452.05	17.85	-47.6	-39.9	-49.95	2.35
63	2452.1	17.25	-48.2	-40.5	-49.95	1.75
64	2452.15	17.15	-48.3	-40.6	-49.95	1.65
65	2452.2	17.25	-48.2	-40.5	-49.95	1.75
66	2452.25	16.85	-48.6	-40.9	-49.95	1.35
67	2452.3	16.85	-48.6	-40.9	-49.95	1.35
68	2452.35	16.65	-48.8	-41.1	-49.95	1.15
69	2452.4	16.25	-49.2	-41.5	-49.95	0.75
70	2452.45	16.35	-49.1	-41.4	-49.95	0.85
71	2452.5	16.25	-49.2	-41.5	-49.95	0.75
72	2452.55	16.05	-49.4	-41.7	-49.95	0.55
73	2452.6	15.85	-49.6	-41.9	-49.95	0.35
74	2452.65	15.55	-49.9	-42.2	-49.95	0.05
75	2452.7	15.65	-49.8	-42.1	-49.95	0.15
76	2452.75	15.75	-49.7	-42	-49.95	0.25
77	2452.8	15.35	-50.1	-42.4	-49.95	-0.15
78	2452.85	15.25	-50.2	-42.5	-49.95	-0.25
79	2452.9	15.25	-50.2	-42.5	-49.95	-0.25
80	2452.95	15.05	-50.4	-42.7	-49.95	-0.45

81	2453	14.95	-50.5	-42.8	-49.95	-0.55
82	2453.05	14.85	-50.6	-42.9	-49.95	-0.65
83	2453.1	14.35	-51.1	-43.4	-49.95	-1.15
84	2453.15	14.45	-51	-43.3	-49.95	-1.05
85	2453.2	14.55	-50.9	-43.2	-49.95	-0.95
86	2453.25	14.15	-51.3	-43.6	-49.95	-1.35
87	2453.3	14.15	-51.3	-43.6	-49.95	-1.35
88	2453.35	14.05	-51.4	-43.7	-49.95	-1.45
89	2453.4	14.05	-51.4	-43.7	-49.95	-1.45
90	2453.45	14.15	-51.3	-43.6	-49.95	-1.35
91	2453.5	13.95	-51.5	-43.8	-49.95	-1.55
92	2453.55	13.75	-51.7	-44	-49.95	-1.75
93	2453.6	13.85	-51.6	-43.9	-49.95	-1.65
94	2453.65	13.75	-51.7	-44	-49.95	-1.75
95	2453.7	13.75	-51.7	-44	-49.95	-1.75
96	2453.75	13.55	-51.9	-44.2	-49.95	-1.95
97	2453.8	13.25	-52.2	-44.5	-49.95	-2.25
98	2453.85	13.35	-52.1	-44.4	-49.95	-2.15
99	2453.9	13.45	-52	-44.3	-49.95	-2.05
100	2453.95	13.15	-52.3	-44.6	-49.95	-2.35
101	2454	13.05	-52.4	-44.7	-49.95	-2.45
102	2454.05	13.05	-52.4	-44.7	-49.95	-2.45
103	2454.1	12.95	-52.5	-44.8	-49.95	-2.55
104	2454.15	13.05	-52.4	-44.7	-49.95	-2.45
105	2454.2	12.95	-52.5	-44.8	-49.95	-2.55
106	2454.25	12.65	-52.8	-45.1	-49.95	-2.85
107	2454.3	12.65	-52.8	-45.1	-49.95	-2.85
108	2454.35	12.75	-52.7	-45	-49.95	-2.75
109	2454.4	12.65	-52.8	-45.1	-49.95	-2.85
110	2454.45	12.45	-53	-45.3	-49.95	-3.05
111	2454.5	12.45	-53	-45.3	-49.95	-3.05
112	2454.55	12.45	-53	-45.3	-49.95	-3.05
113	2454.6	12.65	-52.8	-45.1	-49.95	-2.85
114	2454.65	12.65	-52.8	-45.1	-49.95	-2.85
115	2454.7	12.55	-52.9	-45.2	-49.95	-2.95
116	2454.75	12.55	-52.9	-45.2	-49.95	-2.95
117	2454.8	12.75	-52.7	-45	-49.95	-2.75
118	2454.85	12.75	-52.7	-45	-49.95	-2.75
119	2454.9	12.65	-52.8	-45.1	-49.95	-2.85
120	2454.95	12.45	-53	-45.3	-49.95	-3.05
121	2455	12.55	-52.9	-45.2	-49.95	-2.95
122	2455.05	12.65	-52.8	-45.1	-49.95	-2.85
123	2455.1	12.55	-52.9	-45.2	-49.95	-2.95
124	2455.15	12.45	-53	-45.3	-49.95	-3.05

125	2455.2	12.45	-53	-45.3	-49.95	-3.05
126	2455.25	12.55	-52.9	-45.2	-49.95	-2.95
127	2455.3	12.65	-52.8	-45.1	-49.95	-2.85
128	2455.35	12.55	-52.9	-45.2	-49.95	-2.95
129	2455.4	12.45	-53	-45.3	-49.95	-3.05
130	2455.45	12.45	-53	-45.3	-49.95	-3.05
131	2455.5	12.55	-52.9	-45.2	-49.95	-2.95
132	2455.55	12.55	-52.9	-45.2	-49.95	-2.95
133	2455.6	12.45	-53	-45.3	-49.95	-3.05
134	2455.65	12.25	-53.2	-45.5	-49.95	-3.25
135	2455.7	12.35	-53.1	-45.4	-49.95	-3.15
136	2455.75	12.45	-53	-45.3	-49.95	-3.05
137	2455.8	12.45	-53	-45.3	-49.95	-3.05
138	2455.85	12.35	-53.1	-45.4	-49.95	-3.15
139	2455.9	12.35	-53.1	-45.4	-49.95	-3.15
140	2455.95	12.45	-53	-45.3	-49.95	-3.05
141	2456	12.55	-52.9	-45.2	-49.95	-2.95
142	2456.05	12.55	-52.9	-45.2	-49.95	-2.95
143	2456.1	12.35	-53.1	-45.4	-49.95	-3.15
144	2456.15	12.35	-53.1	-45.4	-49.95	-3.15
145	2456.2	12.45	-53	-45.3	-49.95	-3.05
146	2456.25	12.35	-53.1	-45.4	-49.95	-3.15
147	2456.3	12.25	-53.2	-45.5	-49.95	-3.25
148	2456.35	12.15	-53.3	-45.6	-49.95	-3.35
149	2456.4	12.15	-53.3	-45.6	-49.95	-3.35
150	2456.45	12.25	-53.2	-45.5	-49.95	-3.25
151	2456.5	12.25	-53.2	-45.5	-49.95	-3.25
152	2456.55	12.15	-53.3	-45.6	-49.95	-3.35
153	2456.6	12.15	-53.3	-45.6	-49.95	-3.35
154	2456.65	12.15	-53.3	-45.6	-49.95	-3.35
155	2456.7	12.25	-53.2	-45.5	-49.95	-3.25
156	2456.75	12.15	-53.3	-45.6	-49.95	-3.35
157	2456.8	12.05	-53.4	-45.7	-49.95	-3.45
158	2456.85	12.05	-53.4	-45.7	-49.95	-3.45
159	2456.9	12.15	-53.3	-45.6	-49.95	-3.35
160	2456.95	12.15	-53.3	-45.6	-49.95	-3.35
161	2457	12.05	-53.4	-45.7	-49.95	-3.45
162	2457.05	11.95	-53.5	-45.8	-49.95	-3.55
163	2457.1	12.05	-53.4	-45.7	-49.95	-3.45
164	2457.15	12.15	-53.3	-45.6	-49.95	-3.35
165	2457.2	12.15	-53.3	-45.6	-49.95	-3.35
166	2457.25	12.05	-53.4	-45.7	-49.95	-3.45
167	2457.3	12.05	-53.4	-45.7	-49.95	-3.45
168	2457.35	12.15	-53.3	-45.6	-49.95	-3.35

169	2457.4	12.15	-53.3	-45.6	-49.95	-3.35
170	2457.45	12.05	-53.4	-45.7	-49.95	-3.45
171	2457.5	11.85	-53.6	-45.9	-49.95	-3.65
172	2457.55	11.85	-53.6	-45.9	-49.95	-3.65
173	2457.6	11.95	-53.5	-45.8	-49.95	-3.55
174	2457.65	11.95	-53.5	-45.8	-49.95	-3.55
175	2457.7	11.75	-53.7	-46	-49.95	-3.75
176	2457.75	11.75	-53.7	-46	-49.95	-3.75
177	2457.8	11.85	-53.6	-45.9	-49.95	-3.65
178	2457.85	11.95	-53.5	-45.8	-49.95	-3.55
179	2457.9	11.95	-53.5	-45.8	-49.95	-3.55
180	2457.95	11.75	-53.7	-46	-49.95	-3.75
181	2458	11.75	-53.7	-46	-49.95	-3.75
182	2458.05	11.85	-53.6	-45.9	-49.95	-3.65
183	2458.1	11.85	-53.6	-45.9	-49.95	-3.65
184	2458.15	11.75	-53.7	-46	-49.95	-3.75
185	2458.2	11.65	-53.8	-46.1	-49.95	-3.85
186	2458.25	11.65	-53.8	-46.1	-49.95	-3.85
187	2458.3	11.85	-53.6	-45.9	-49.95	-3.65
188	2458.35	11.85	-53.6	-45.9	-49.95	-3.65
189	2458.4	11.75	-53.7	-46	-49.95	-3.75
190	2458.45	11.75	-53.7	-46	-49.95	-3.75
191	2458.5	11.85	-53.6	-45.9	-49.95	-3.65
192	2458.55	11.95	-53.5	-45.8	-49.95	-3.55
193	2458.6	11.95	-53.5	-45.8	-49.95	-3.55
194	2458.65	11.75	-53.7	-46	-49.95	-3.75
195	2458.7	11.75	-53.7	-46	-49.95	-3.75
196	2458.75	11.75	-53.7	-46	-49.95	-3.75
197	2458.8	11.85	-53.6	-45.9	-49.95	-3.65
198	2458.85	11.75	-53.7	-46	-49.95	-3.75
199	2458.9	11.55	-53.9	-46.2	-49.95	-3.95
200	2458.95	11.65	-53.8	-46.1	-49.95	-3.85
201	2459	11.85	-53.6	-45.9	-49.95	-3.65
202	2459.05	11.85	-53.6	-45.9	-49.95	-3.65
203	2459.1	11.75	-53.7	-46	-49.95	-3.75
204	2459.15	11.75	-53.7	-46	-49.95	-3.75
205	2459.2	11.85	-53.6	-45.9	-49.95	-3.65
206	2459.25	11.95	-53.5	-45.8	-49.95	-3.55
207	2459.3	11.85	-53.6	-45.9	-49.95	-3.65
208	2459.35	11.75	-53.7	-46	-49.95	-3.75
209	2459.4	11.75	-53.7	-46	-49.95	-3.75
210	2459.45	11.85	-53.6	-45.9	-49.95	-3.65
211	2459.5	11.85	-53.6	-45.9	-49.95	-3.65
212	2459.55	11.85	-53.6	-45.9	-49.95	-3.65

213	2459.6	11.75	-53.7	-46	-49.95	-3.75
214	2459.65	11.75	-53.7	-46	-49.95	-3.75
215	2459.7	11.95	-53.5	-45.8	-49.95	-3.55
216	2459.75	11.95	-53.5	-45.8	-49.95	-3.55
217	2459.8	11.85	-53.6	-45.9	-49.95	-3.65
218	2459.85	11.75	-53.7	-46	-49.95	-3.75
219	2459.9	11.85	-53.6	-45.9	-49.95	-3.65
220	2459.95	11.85	-53.6	-45.9	-49.95	-3.65
221	2460	11.75	-53.7	-46	-49.95	-3.75
222	2460.05	11.55	-53.9	-46.2	-49.95	-3.95
223	2460.1	11.55	-53.9	-46.2	-49.95	-3.95
224	2460.15	11.55	-53.9	-46.2	-49.95	-3.95
225	2460.2	11.65	-53.8	-46.1	-49.95	-3.85
226	2460.25	11.55	-53.9	-46.2	-49.95	-3.95
227	2460.3	11.35	-54.1	-46.4	-49.95	-4.15
228	2460.35	11.35	-54.1	-46.4	-49.95	-4.15
229	2460.4	11.55	-53.9	-46.2	-49.95	-3.95
230	2460.45	11.45	-54	-46.3	-49.95	-4.05
231	2460.5	11.25	-54.2	-46.5	-49.95	-4.25
232	2460.55	11.25	-54.2	-46.5	-49.95	-4.25
233	2460.6	11.25	-54.2	-46.5	-49.95	-4.25
234	2460.65	11.25	-54.2	-46.5	-49.95	-4.25
235	2460.7	11.15	-54.3	-46.6	-49.95	-4.35
236	2460.75	11.05	-54.4	-46.7	-49.95	-4.45
237	2460.8	10.95	-54.5	-46.8	-49.95	-4.55
238	2460.85	11.15	-54.3	-46.6	-49.95	-4.35
239	2460.9	11.25	-54.2	-46.5	-49.95	-4.25
240	2460.95	11.15	-54.3	-46.6	-49.95	-4.35
241	2461	11.05	-54.4	-46.7	-49.95	-4.45
242	2461.05	11.25	-54.2	-46.5	-49.95	-4.25
243	2461.1	11.35	-54.1	-46.4	-49.95	-4.15
244	2461.15	11.35	-54.1	-46.4	-49.95	-4.15
245	2461.2	11.25	-54.2	-46.5	-49.95	-4.25
246	2461.25	11.25	-54.2	-46.5	-49.95	-4.25
247	2461.3	11.35	-54.1	-46.4	-49.95	-4.15
248	2461.35	11.55	-53.9	-46.2	-49.95	-3.95
249	2461.4	11.55	-53.9	-46.2	-49.95	-3.95
250	2461.45	11.45	-54	-46.3	-49.95	-4.05
251	2461.5	11.65	-53.8	-46.1	-49.95	-3.85
252	2461.55	11.85	-53.6	-45.9	-49.95	-3.65
253	2461.6	11.95	-53.5	-45.8	-49.95	-3.55
254	2461.65	11.95	-53.5	-45.8	-49.95	-3.55
255	2461.7	11.95	-53.5	-45.8	-49.95	-3.55
256	2461.75	12.05	-53.4	-45.7	-49.95	-3.45

257	2461.8	12.25	-53.2	-45.5	-49.95	-3.25
258	2461.85	12.25	-53.2	-45.5	-49.95	-3.25
259	2461.9	12.05	-53.4	-45.7	-49.95	-3.45
260	2461.95	12.05	-53.4	-45.7	-49.95	-3.45
261	2462	12.15	-53.3	-45.6	-49.95	-3.35
262	2462.05	12.25	-53.2	-45.5	-49.95	-3.25
263	2462.1	12.25	-53.2	-45.5	-49.95	-3.25
264	2462.15	12.05	-53.4	-45.7	-49.95	-3.45
265	2462.2	12.15	-53.3	-45.6	-49.95	-3.35
266	2462.25	12.25	-53.2	-45.5	-49.95	-3.25
267	2462.3	12.25	-53.2	-45.5	-49.95	-3.25
268	2462.35	12.15	-53.3	-45.6	-49.95	-3.35
269	2462.4	12.05	-53.4	-45.7	-49.95	-3.45
270	2462.45	12.05	-53.4	-45.7	-49.95	-3.45
271	2462.5	12.15	-53.3	-45.6	-49.95	-3.35
272	2462.55	12.05	-53.4	-45.7	-49.95	-3.45
273	2462.6	11.85	-53.6	-45.9	-49.95	-3.65
274	2462.65	11.85	-53.6	-45.9	-49.95	-3.65
275	2462.7	11.95	-53.5	-45.8	-49.95	-3.55
276	2462.75	12.05	-53.4	-45.7	-49.95	-3.45
277	2462.8	12.05	-53.4	-45.7	-49.95	-3.45
278	2462.85	11.95	-53.5	-45.8	-49.95	-3.55
279	2462.9	11.95	-53.5	-45.8	-49.95	-3.55
280	2462.95	12.15	-53.3	-45.6	-49.95	-3.35
281	2463	12.15	-53.3	-45.6	-49.95	-3.35
282	2463.05	12.05	-53.4	-45.7	-49.95	-3.45
283	2463.1	11.95	-53.5	-45.8	-49.95	-3.55
284	2463.15	12.05	-53.4	-45.7	-49.95	-3.45
285	2463.2	12.15	-53.3	-45.6	-49.95	-3.35
286	2463.25	12.05	-53.4	-45.7	-49.95	-3.45
287	2463.3	11.95	-53.5	-45.8	-49.95	-3.55
288	2463.35	11.95	-53.5	-45.8	-49.95	-3.55
289	2463.4	12.05	-53.4	-45.7	-49.95	-3.45
290	2463.45	12.15	-53.3	-45.6	-49.95	-3.35
291	2463.5	12.05	-53.4	-45.7	-49.95	-3.45
292	2463.55	11.95	-53.5	-45.8	-49.95	-3.55
293	2463.6	11.95	-53.5	-45.8	-49.95	-3.55
294	2463.65	12.05	-53.4	-45.7	-49.95	-3.45
295	2463.7	12.05	-53.4	-45.7	-49.95	-3.45
296	2463.75	11.95	-53.5	-45.8	-49.95	-3.55
297	2463.8	11.75	-53.7	-46	-49.95	-3.75
298	2463.85	11.85	-53.6	-45.9	-49.95	-3.65
299	2463.9	11.95	-53.5	-45.8	-49.95	-3.55
300	2463.95	11.95	-53.5	-45.8	-49.95	-3.55

301	2464	11.85	-53.6	-45.9	-49.95	-3.65
302	2464.05	11.85	-53.6	-45.9	-49.95	-3.65
303	2464.1	11.95	-53.5	-45.8	-49.95	-3.55
304	2464.15	12.05	-53.4	-45.7	-49.95	-3.45
305	2464.2	12.05	-53.4	-45.7	-49.95	-3.45
306	2464.25	11.85	-53.6	-45.9	-49.95	-3.65
307	2464.3	11.95	-53.5	-45.8	-49.95	-3.55
308	2464.35	12.05	-53.4	-45.7	-49.95	-3.45
309	2464.4	11.95	-53.5	-45.8	-49.95	-3.55
310	2464.45	11.85	-53.6	-45.9	-49.95	-3.65
311	2464.5	11.75	-53.7	-46	-49.95	-3.75
312	2464.55	11.75	-53.7	-46	-49.95	-3.75
313	2464.6	11.95	-53.5	-45.8	-49.95	-3.55
314	2464.65	11.85	-53.6	-45.9	-49.95	-3.65
315	2464.7	11.75	-53.7	-46	-49.95	-3.75
316	2464.75	11.75	-53.7	-46	-49.95	-3.75
317	2464.8	11.85	-53.6	-45.9	-49.95	-3.65
318	2464.85	11.95	-53.5	-45.8	-49.95	-3.55
319	2464.9	11.85	-53.6	-45.9	-49.95	-3.65
320	2464.95	11.65	-53.8	-46.1	-49.95	-3.85
321	2465	11.65	-53.8	-46.1	-49.95	-3.85
322	2465.05	11.75	-53.7	-46	-49.95	-3.75
323	2465.1	11.75	-53.7	-46	-49.95	-3.75
324	2465.15	11.65	-53.8	-46.1	-49.95	-3.85
325	2465.2	11.65	-53.8	-46.1	-49.95	-3.85
326	2465.25	11.75	-53.7	-46	-49.95	-3.75
327	2465.3	11.85	-53.6	-45.9	-49.95	-3.65
328	2465.35	11.85	-53.6	-45.9	-49.95	-3.65
329	2465.4	11.75	-53.7	-46	-49.95	-3.75
330	2465.45	11.75	-53.7	-46	-49.95	-3.75
331	2465.5	11.95	-53.5	-45.8	-49.95	-3.55
332	2465.55	11.95	-53.5	-45.8	-49.95	-3.55
333	2465.6	11.85	-53.6	-45.9	-49.95	-3.65
334	2465.65	11.75	-53.7	-46	-49.95	-3.75
335	2465.7	11.75	-53.7	-46	-49.95	-3.75
336	2465.75	11.85	-53.6	-45.9	-49.95	-3.65
337	2465.8	11.85	-53.6	-45.9	-49.95	-3.65
338	2465.85	11.75	-53.7	-46	-49.95	-3.75
339	2465.9	11.65	-53.8	-46.1	-49.95	-3.85
340	2465.95	11.75	-53.7	-46	-49.95	-3.75
341	2466	11.95	-53.5	-45.8	-49.95	-3.55
342	2466.05	11.85	-53.6	-45.9	-49.95	-3.65
343	2466.1	11.75	-53.7	-46	-49.95	-3.75
344	2466.15	11.75	-53.7	-46	-49.95	-3.75

345	2466.2	11.85	-53.6	-45.9	-49.95	-3.65
346	2466.25	11.85	-53.6	-45.9	-49.95	-3.65
347	2466.3	11.75	-53.7	-46	-49.95	-3.75
348	2466.35	11.65	-53.8	-46.1	-49.95	-3.85
349	2466.4	11.75	-53.7	-46	-49.95	-3.75
350	2466.45	11.85	-53.6	-45.9	-49.95	-3.65
351	2466.5	11.95	-53.5	-45.8	-49.95	-3.55
352	2466.55	11.85	-53.6	-45.9	-49.95	-3.65
353	2466.6	11.85	-53.6	-45.9	-49.95	-3.65
354	2466.65	12.05	-53.4	-45.7	-49.95	-3.45
355	2466.7	12.15	-53.3	-45.6	-49.95	-3.35
356	2466.75	12.15	-53.3	-45.6	-49.95	-3.35
357	2466.8	12.05	-53.4	-45.7	-49.95	-3.45
358	2466.85	12.05	-53.4	-45.7	-49.95	-3.45
359	2466.9	12.15	-53.3	-45.6	-49.95	-3.35
360	2466.95	12.25	-53.2	-45.5	-49.95	-3.25
361	2467	12.05	-53.4	-45.7	-49.95	-3.45
362	2467.05	11.95	-53.5	-45.8	-49.95	-3.55
363	2467.1	12.15	-53.3	-45.6	-49.95	-3.35
364	2467.15	12.25	-53.2	-45.5	-49.95	-3.25
365	2467.2	12.25	-53.2	-45.5	-49.95	-3.25
366	2467.25	12.25	-53.2	-45.5	-49.95	-3.25
367	2467.3	12.15	-53.3	-45.6	-49.95	-3.35
368	2467.35	12.35	-53.1	-45.4	-49.95	-3.15
369	2467.4	12.45	-53	-45.3	-49.95	-3.05
370	2467.45	12.35	-53.1	-45.4	-49.95	-3.15
371	2467.5	12.25	-53.2	-45.5	-49.95	-3.25
372	2467.55	12.25	-53.2	-45.5	-49.95	-3.25
373	2467.6	12.35	-53.1	-45.4	-49.95	-3.15
374	2467.65	12.35	-53.1	-45.4	-49.95	-3.15
375	2467.7	12.35	-53.1	-45.4	-49.95	-3.15
376	2467.75	12.25	-53.2	-45.5	-49.95	-3.25
377	2467.8	12.35	-53.1	-45.4	-49.95	-3.15
378	2467.85	12.55	-52.9	-45.2	-49.95	-2.95
379	2467.9	12.55	-52.9	-45.2	-49.95	-2.95
380	2467.95	12.45	-53	-45.3	-49.95	-3.05
381	2468	12.45	-53	-45.3	-49.95	-3.05
382	2468.05	12.55	-52.9	-45.2	-49.95	-2.95
383	2468.1	12.65	-52.8	-45.1	-49.95	-2.85
384	2468.15	12.65	-52.8	-45.1	-49.95	-2.85
385	2468.2	12.45	-53	-45.3	-49.95	-3.05
386	2468.25	12.45	-53	-45.3	-49.95	-3.05
387	2468.3	12.75	-52.7	-45	-49.95	-2.75
388	2468.35	12.75	-52.7	-45	-49.95	-2.75

389	2468.4	12.65	-52.8	-45.1	-49.95	-2.85
390	2468.45	12.75	-52.7	-45	-49.95	-2.75
391	2468.5	12.85	-52.6	-44.9	-49.95	-2.65
392	2468.55	12.95	-52.5	-44.8	-49.95	-2.55
393	2468.6	13.15	-52.3	-44.6	-49.95	-2.35
394	2468.65	13.05	-52.4	-44.7	-49.95	-2.45
395	2468.7	13.05	-52.4	-44.7	-49.95	-2.45
396	2468.75	13.25	-52.2	-44.5	-49.95	-2.25
397	2468.8	13.35	-52.1	-44.4	-49.95	-2.15
398	2468.85	13.35	-52.1	-44.4	-49.95	-2.15
399	2468.9	13.25	-52.2	-44.5	-49.95	-2.25
400	2468.95	13.35	-52.1	-44.4	-49.95	-2.15
401	2469	13.55	-51.9	-44.2	-49.95	-1.95
402	2469.05	13.65	-51.8	-44.1	-49.95	-1.85
403	2469.1	13.65	-51.8	-44.1	-49.95	-1.85
404	2469.15	13.75	-51.7	-44	-49.95	-1.75
405	2469.2	13.85	-51.6	-43.9	-49.95	-1.65
406	2469.25	14.05	-51.4	-43.7	-49.95	-1.45
407	2469.3	14.15	-51.3	-43.6	-49.95	-1.35
408	2469.35	14.05	-51.4	-43.7	-49.95	-1.45
409	2469.4	13.95	-51.5	-43.8	-49.95	-1.55
410	2469.45	14.25	-51.2	-43.5	-49.95	-1.25
411	2469.5	14.35	-51.1	-43.4	-49.95	-1.15
412	2469.55	14.35	-51.1	-43.4	-49.95	-1.15
413	2469.6	14.35	-51.1	-43.4	-49.95	-1.15
414	2469.65	14.55	-50.9	-43.2	-49.95	-0.95
415	2469.7	14.75	-50.7	-43	-49.95	-0.75
416	2469.75	14.95	-50.5	-42.8	-49.95	-0.55
417	2469.8	14.95	-50.5	-42.8	-49.95	-0.55
418	2469.85	14.95	-50.5	-42.8	-49.95	-0.55
419	2469.9	15.15	-50.3	-42.6	-49.95	-0.35
420	2469.95	15.35	-50.1	-42.4	-49.95	-0.15
421	2470	15.35	-50.1	-42.4	-49.95	-0.15
422	2470.05	15.25	-50.2	-42.5	-49.95	-0.25
423	2470.1	15.35	-50.1	-42.4	-49.95	-0.15
424	2470.15	15.45	-50	-42.3	-49.95	-0.05
425	2470.2	15.55	-49.9	-42.2	-49.95	0.05
426	2470.25	15.65	-49.8	-42.1	-49.95	0.15
427	2470.3	15.55	-49.9	-42.2	-49.95	0.05
428	2470.35	15.85	-49.6	-41.9	-49.95	0.35
429	2470.4	16.05	-49.4	-41.7	-49.95	0.55
430	2470.45	16.05	-49.4	-41.7	-49.95	0.55
431	2470.5	16.25	-49.2	-41.5	-49.95	0.75
432	2470.55	16.25	-49.2	-41.5	-49.95	0.75

433	2470.6	16.25	-49.2	-41.5	-49.95	0.75
434	2470.65	16.85	-48.6	-40.9	-49.95	1.35
435	2470.7	16.75	-48.7	-41	-49.95	1.25
436	2470.75	16.65	-48.8	-41.1	-49.95	1.15
437	2470.8	17.25	-48.2	-40.5	-49.95	1.75
438	2470.85	17.35	-48.1	-40.4	-49.95	1.85
439	2470.9	17.45	-48	-40.3	-49.95	1.95
440	2470.95	18.05	-47.4	-39.7	-49.95	2.55
441	2471	17.95	-47.5	-39.8	-49.95	2.45
442	2471.05	18.05	-47.4	-39.7	-49.95	2.55
443	2471.1	18.85	-46.6	-38.9	-49.95	3.35
444	2471.15	18.85	-46.6	-38.9	-49.95	3.35
445	2471.2	18.75	-46.7	-39	-49.95	3.25
446	2471.25	19.15	-46.3	-38.6	-49.95	3.65
447	2471.3	19.25	-46.2	-38.5	-49.95	3.75
448	2471.35	19.65	-45.8	-38.1	-49.95	4.15
449	2471.4	19.85	-45.6	-37.9	-49.95	4.35
450	2471.45	19.75	-45.7	-38	-49.95	4.25
451	2471.5	20.15	-45.3	-37.6	-49.95	4.65
452	2471.55	20.55	-44.9	-37.2	-49.95	5.05
453	2471.6	20.65	-44.8	-37.1	-49.95	5.15
454	2471.65	21.25	-44.2	-36.5	-49.95	5.75
455	2471.7	21.15	-44.3	-36.6	-49.95	5.65
456	2471.75	21.25	-44.2	-36.5	-49.95	5.75
457	2471.8	22.25	-43.2	-35.5	-49.95	6.75
458	2471.85	22.15	-43.3	-35.6	-49.95	6.65
459	2471.9	22.05	-43.4	-35.7	-49.95	6.55
460	2471.95	22.85	-42.6	-34.9	-49.95	7.35
461	2472	22.95	-42.5	-34.8	-49.95	7.45
462	2472.05	22.95	-42.5	-34.8	-49.95	7.45
463	2472.1	23.85	-41.6	-33.9	-49.95	8.35
464	2472.15	23.75	-41.7	-34	-49.95	8.25
465	2472.2	23.75	-41.7	-34	-49.95	8.25
466	2472.25	24.65	-40.8	-33.1	-49.95	9.15
467	2472.3	24.75	-40.7	-33	-49.95	9.25
468	2472.35	24.95	-40.5	-32.8	-49.95	9.45
469	2472.4	25.35	-40.1	-32.4	-49.95	9.85
470	2472.45	25.35	-40.1	-32.4	-49.95	9.85
471	2472.5	25.95	-39.5	-31.8	-49.95	10.45
472	2472.55	26.25	-39.2	-31.5	-49.95	10.75
473	2472.6	26.05	-39.4	-31.7	-49.95	10.55
474	2472.65	26.75	-38.7	-31	-49.95	11.25
475	2472.7	26.85	-38.6	-30.9	-49.95	11.35
476	2472.75	26.95	-38.5	-30.8	-49.95	11.45

477	2472.8	27.75	-37.7	-30	-49.95	12.25
478	2472.85	27.65	-37.8	-30.1	-49.95	12.15
479	2472.9	28.95	-36.5	-28.8	-49.95	13.45
480	2472.95	30.05	-35.4	-27.7	-49.95	14.55
481	2473	31.55	-33.9	-26.2	-49.95	16.05