

Scope

This report presents the test procedure, test configuration and test data associated with a FCC Part 15.247 (e) Jamming Margin test for the processing gain.

Theoretical calculations

The processing gain is related to the jamming margin as follows [2]:

$$G_p = \left(\frac{S}{N} \right)_{output} + \left(\frac{J}{S} \right) + L_{system}$$

Where $BER_{REFERENCE}$ is the reference bit error ratio with its corresponding, theoretical output signal to noise ratio per symbol, $(S/N)_{output}$, (J/S) is the jamming margin (jamming signal power relative to desired signal power), and L_{system} are the system implementation losses.

The maximum allowed total system implementation loss is 2 dB.

The HFA3861B direct sequence spread spectrum baseband processor uses CCK modulation which is a form of M-ary Orthogonal Keying. The BER performance curve is given by [5]:

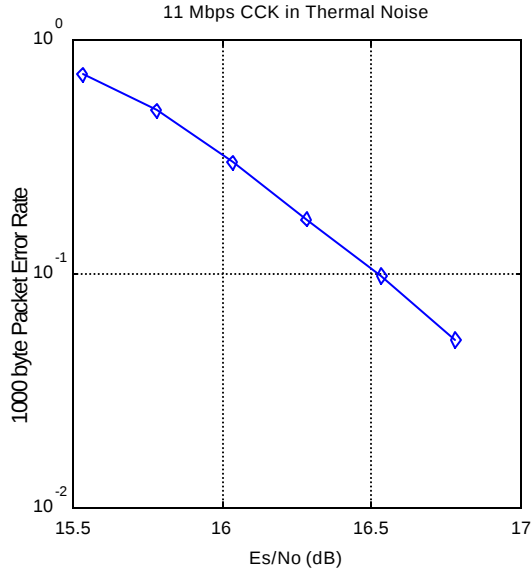
“ The probability of error for generalized M-ary Orthogonal signaling using coherent demodulation is given by:

$$P_e = 1 - P_{c1} = 1 - \frac{1}{\sqrt{2p}} \int_{-\frac{S_{01}}{N_0}}^{\infty} \left[2(1 - Q\left\{ z + \sqrt{2 \frac{E_b}{h}} \right\}) \right]^{\frac{M}{2}-1} \exp\left\{ -\frac{z^2}{2} \right\} dz$$

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This integral cannot be solved in closed form, and numerical integration must be used. There are error rate extensions for differential decoding and descrambling that are also to be accounted for. This is done in a MATHCAD environment and is displayed in graphical format below.

1.1 1000 byte PER vs. Es/No



The reference PER is specified as 8% . The corresponding Es/No (signal to noise ratio per symbol) is 16.4 dB. The Es/No required to achieve the desired BER with maximum system implementation losses is 18.4 dB. The minimum processing gain is again, 10 dB, therefore:

$$G_p = \left(\frac{E_s}{N_o} \right)_{\text{output}} + \left(\frac{J}{S} \right) + L_{\text{system}} = 16.4 \text{ dB} + 2.0 \text{ dB} + \left(\frac{J}{S} \right) \geq 10 \text{ dB}$$

$$G_p = 18.4 \text{ dB} + \left(\frac{J}{S} \right) \geq 10 \text{ dB}$$

The minimum jammer to signal ratio is as follows:

$$\left(\frac{J}{S} \right) \geq -8.4 \text{ dB}$$

For the case of the HFA3861B, the bit rates are 1, 2, 5.5, and 11 Mbps. The corresponding symbol rates are 1, 1, 1.375, and 1.375 MSps. The chip rate is always 11 MCps, so the ratio

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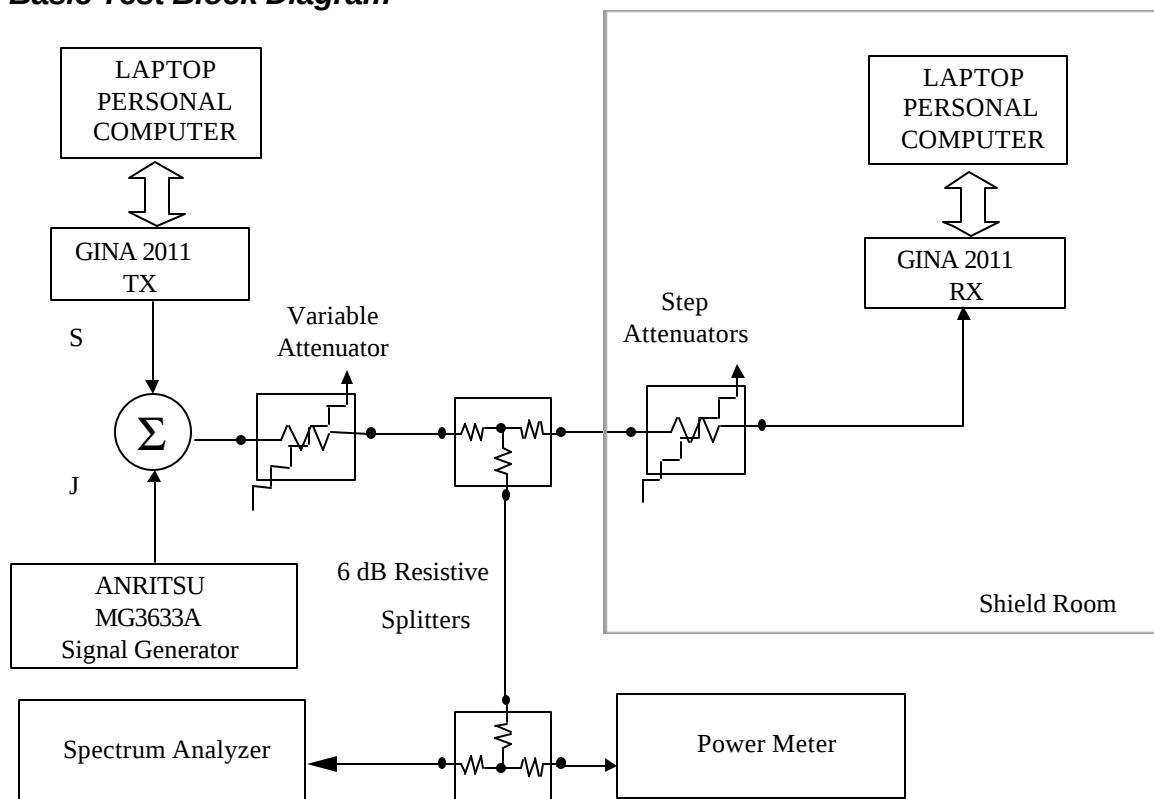
of chip rate to symbol rate is 11:1 for the 1 and 2 Mbps rates and 8:1 for the 5.5 and 11 Mbps rates. Since the symbol rate to bit rate is less than 10 for the higher rates, we supply the theoretical processing gain calculation for these cases where spread spectrum processing gain with embedded coding gain is utilized. This is reasonable in that they cannot be separated in the demodulation process. If a separable FEC coding scheme were used, we would not be comfortable making this assertion.

As can be seen from the curve of figure 1, the E_s/N_0 is 16.4 dB at the PER of 8%. This PER can be related to a BER of $1e-5$ on 1000 byte packets. Taking the calculations above, if the

$\left(\frac{J}{S}\right) \geq -8.4 \text{ dB}$ then the equipment passes the CW jamming test.

Test Configuration: CW Jamming Margin (15.247) (e)

Basic Test Block Diagram



Test Procedure

Setup the simplex link shown. Perform all independent instrumentation calibrations prior to this procedure. Set operating power levels using fixed and variable attenuators in system to meet the following objectives:

- Signal Power at receiver approximately -60 dBm (above thermal sensitivity such that thermal noise does not cause bit errors).
- Signal Power at power meter (using high sensitivity probe) between -20 and -40 dBm for optimal linearity.
- Use spectrum analyzer to monitor test.
- Ensure that CW Jammer generator RF output is disabled and measure the power at the power meter port using the power meter. This is the relative signal power, S_r .
- Disable Transmitter, and set CW Jammer generator RF output frequency equal to the carrier frequency and enable generator output. Set reference CW Jammer power level at power meter port 8.4 dB below S_r (minimum J/S, or 10 dB processing gain reference level). Note the power level setting on the generator, this is the reference CW Jammer power setting, J_r .
- Disable CW Jammer, re-establish link. PER test should be operating essentially error-free.
- Adjust the CW Jammer level to that which causes 8% PER and verify that the S/J is less than 8.4 dB.
- Repeat step 7 for uniform steps in frequency increments of 50 kHz across the receiver passband with the CW Jammer. In this case the receiver passband is ± 8.5 MHz.

The number of points where the S/J fails to achieve 8.4 dB (is higher than 8.4 dB) is determined and if this is above 20% of the total, the test is failed otherwise it is passed.

The numerical data associated with the following radio channels is tabulated and presented for:

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Channel 1: 2412 MHz
Channel 6: 2437 MHz
Channel 11: 2462 MHz

Test result for CH 1 Center frequency (Fc)=2.412 GHz

SSG- CW Jammer Fc+/- MHz	Es/No (dB)	L system (dB)	Jam Level (-dBm)	Signal pwr (-dBm)	J/S (-dB)	PER (%)	Gp (process gain) (dB)
-8.500	16.4	2	62	60	2	8	16.4
-8.450	16.4	2	62	60	2	8	16.4
-8.400	16.4	2	62	60	2	8	16.4
-8.350	16.4	2	62	60	2	8	16.4
-8.300	16.4	2	62	60	2	8	16.4
-8.250	16.4	2	62	60	2	8	16.4
-8.200	16.4	2	62	60	2	8	16.4
-8.150	16.4	2	62	60	2	8	16.4
-8.100	16.4	2	62	60	2	8	16.4
-8.050	16.4	2	62	60	2	8	16.4
-8.000	16.4	2	62	60	2	8	16.4
-7.950	16.4	2	62	60	2	8	16.4
-7.900	16.4	2	62	60	2	8	16.4
-7.850	16.4	2	62	60	2	8	16.4
-7.800	16.4	2	62	60	2	8	16.4
-7.750	16.4	2	62	60	2	8	16.4
-7.700	16.4	2	62	60	2	8	16.4
-7.650	16.4	2	62	60	2	8	16.4
-7.600	16.4	2	62	60	2	8	16.4
-7.550	16.4	2	62	60	2	8	16.4
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-7.150	16.4	2	62	60	2	8	16.4
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-7.050	16.4	2	62	60	2	8	16.4
-7.000	16.4	2	62	60	2	8	16.4
-6.950	16.4	2	62	60	2	8	16.4
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-5.550	16.4	2	63	60	3	8	15.4
-5.500	16.4	2	64	60	4	8	14.4
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-2.250	16.4	2	67	60	7	8	11.4
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-2.000	16.4	2	67	60	7	8	11.4
-1.950	16.4	2	67	60	7	8	11.4
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0.250	16.4	2	68	60	8	8	10.4
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5.300	16.4	2	63	60	3	8	15.4
5.350	16.4	2	63	60	3	8	15.4
5.400	16.4	2	63	60	3	8	15.4
5.450	16.4	2	63	60	3	8	15.4
5.500	16.4	2	63	60	3	8	15.4
5.550	16.4	2	63	60	3	8	15.4
5.600	16.4	2	63	60	3	8	15.4
5.650	16.4	2	63	60	3	8	15.4
5.700	16.4	2	63	60	3	8	15.4
5.750	16.4	2	63	60	3	8	15.4
5.800	16.4	2	63	60	3	8	15.4
5.850	16.4	2	63	60	3	8	15.4
5.900	16.4	2	63	60	3	8	15.4
5.950	16.4	2	63	60	3	8	15.4
6.000	16.4	2	63	60	3	8	15.4
6.050	16.4	2	63	60	3	8	15.4
6.100	16.4	2	63	60	3	8	15.4
6.150	16.4	2	63	60	3	8	15.4
6.200	16.4	2	63	60	3	8	15.4
6.250	16.4	2	63	60	3	8	15.4
6.300	16.4	2	63	60	3	8	15.4
6.350	16.4	2	63	60	3	8	15.4
6.400	16.4	2	63	60	3	8	15.4
6.450	16.4	2	63	60	3	8	15.4
6.500	16.4	2	63	60	3	8	15.4
6.550	16.4	2	63	60	3	8	15.4
6.600	16.4	2	63	60	3	8	15.4
6.650	16.4	2	63	60	3	8	15.4
6.700	16.4	2	63	60	3	8	15.4
6.750	16.4	2	63	60	3	8	15.4

6.800	16.4	2	63	60	3	8	15.4
6.850	16.4	2	63	60	3	8	15.4
6.900	16.4	2	63	60	3	8	15.4
6.950	16.4	2	63	60	3	8	15.4
7.000	16.4	2	63	60	3	8	15.4
7.050	16.4	2	63	60	3	8	15.4
7.100	16.4	2	63	60	3	8	15.4
7.150	16.4	2	63	60	3	8	15.4
7.200	16.4	2	63	60	3	8	15.4
7.250	16.4	2	63	60	3	8	15.4
7.300	16.4	2	63	60	3	8	15.4
7.350	16.4	2	63	60	3	8	15.4
7.400	16.4	2	63	60	3	8	15.4
7.450	16.4	2	63	60	3	8	15.4
7.500	16.4	2	63	60	3	8	15.4
7.550	16.4	2	63	60	3	8	15.4
7.600	16.4	2	63	60	3	8	15.4
7.650	16.4	2	63	60	3	8	15.4
7.700	16.4	2	63	60	3	8	15.4
7.750	16.4	2	63	60	3	8	15.4
7.800	16.4	2	63	60	3	8	15.4
7.850	16.4	2	63	60	3	8	15.4
7.900	16.4	2	63	60	3	8	15.4
7.950	16.4	2	63	60	3	8	15.4
8.000	16.4	2	63	60	3	8	15.4
8.050	16.4	2	63	60	3	8	15.4
8.100	16.4	2	63	60	3	8	15.4
8.150	16.4	2	63	60	3	8	15.4
8.200	16.4	2	63	60	3	8	15.4
8.250	16.4	2	63	60	3	8	15.4
8.300	16.4	2	63	60	3	8	15.4
8.350	16.4	2	63	60	3	8	15.4
8.400	16.4	2	63	60	3	8	15.4
8.450	16.4	2	63	60	3	8	15.4
8.500	16.4	2	63	60	3	8	15.4

Test result for CH 6 Center frequency (Fc)=2.437 GHz

SSG- CW Jammer Fc+/- MHz	Es/No (dB)	L system (dB)	Jam Level (-dBm)	Signal pwr (-dBm)	J/S (-dB)	PER (%)	Gp (process gain) (dB)
-8.500	16.4	2	62	60	2	8	16.4
-8.450	16.4	2	62	60	2	8	16.4
-8.400	16.4	2	62	60	2	8	16.4
-8.350	16.4	2	62	60	2	8	16.4
-8.300	16.4	2	62	60	2	8	16.4
-8.250	16.4	2	62	60	2	8	16.4
-8.200	16.4	2	62	60	2	8	16.4
-8.150	16.4	2	62	60	2	8	16.4
-8.100	16.4	2	62	60	2	8	16.4
-8.050	16.4	2	62	60	2	8	16.4
-8.000	16.4	2	62	60	2	8	16.4
-7.950	16.4	2	62	60	2	8	16.4
-7.900	16.4	2	62	60	2	8	16.4
-7.850	16.4	2	62	60	2	8	16.4
-7.800	16.4	2	62	60	2	8	16.4
-7.750	16.4	2	62	60	2	8	16.4
-7.700	16.4	2	62	60	2	8	16.4
-7.650	16.4	2	62	60	2	8	16.4
-7.600	16.4	2	62	60	2	8	16.4
-7.550	16.4	2	62	60	2	8	16.4
-7.500	16.4	2	62	60	2	8	16.4
-7.450	16.4	2	62	60	2	8	16.4
-7.400	16.4	2	62	60	2	8	16.4
-7.350	16.4	2	62	60	2	8	16.4
-7.300	16.4	2	62	60	2	8	16.4
-7.250	16.4	2	62	60	2	8	16.4
-7.200	16.4	2	62	60	2	8	16.4
-7.150	16.4	2	62	60	2	8	16.4
-7.100	16.4	2	62	60	2	8	16.4
-7.050	16.4	2	62	60	2	8	16.4
-7.000	16.4	2	62	60	2	8	16.4
-6.950	16.4	2	62	60	2	8	16.4
-6.900	16.4	2	62	60	2	8	16.4
-6.850	16.4	2	62	60	2	8	16.4
-6.800	16.4	2	62	60	2	8	16.4
-6.750	16.4	2	62	60	2	8	16.4
-6.700	16.4	2	62	60	2	8	16.4
-6.650	16.4	2	62	60	2	8	16.4
-6.600	16.4	2	62	60	2	8	16.4
-6.550	16.4	2	62	60	2	8	16.4
-6.500	16.4	2	62	60	2	8	16.4
-6.450	16.4	2	62	60	2	8	16.4
-6.400	16.4	2	62	60	2	8	16.4
-6.350	16.4	2	62	60	2	8	16.4

-6.300	16.4	2	62	60	2	8	16.4
-6.250	16.4	2	62	60	2	8	16.4
-6.200	16.4	2	62	60	2	8	16.4
-6.150	16.4	2	62	60	2	8	16.4
-6.100	16.4	2	62	60	2	8	16.4
-6.050	16.4	2	62	60	2	8	16.4
-6.000	16.4	2	62	60	2	8	16.4
-5.950	16.4	2	63	60	3	8	15.4
-5.900	16.4	2	63	60	3	8	15.4
-5.850	16.4	2	63	60	3	8	15.4
-5.800	16.4	2	63	60	3	8	15.4
-5.750	16.4	2	63	60	3	8	15.4
-5.700	16.4	2	63	60	3	8	15.4
-5.650	16.4	2	63	60	3	8	15.4
-5.600	16.4	2	63	60	3	8	15.4
-5.550	16.4	2	63	60	3	8	15.4
-5.500	16.4	2	63	60	3	8	15.4
-5.450	16.4	2	63	60	3	8	15.4
-5.400	16.4	2	63	60	3	8	15.4
-5.350	16.4	2	63	60	3	8	15.4
-5.300	16.4	2	63	60	3	8	15.4
-5.250	16.4	2	64	60	4	8	14.4
-5.200	16.4	2	64	60	4	8	14.4
-5.150	16.4	2	64	60	4	8	14.4
-5.100	16.4	2	64	60	4	8	14.4
-5.050	16.4	2	64	60	4	8	14.4
-5.000	16.4	2	64	60	4	8	14.4
-4.950	16.4	2	64	60	4	8	14.4
-4.900	16.4	2	64	60	4	8	14.4
-4.850	16.4	2	64	60	4	8	14.4
-4.800	16.4	2	64	60	4	8	14.4
-4.750	16.4	2	64	60	4	8	14.4
-4.700	16.4	2	64	60	4	8	14.4
-4.650	16.4	2	64	60	4	8	14.4
-4.600	16.4	2	64	60	4	8	14.4
-4.550	16.4	2	64	60	4	8	14.4
-4.500	16.4	2	64	60	4	8	14.4
-4.450	16.4	2	64	60	4	8	14.4
-4.400	16.4	2	64	60	4	8	14.4
-4.350	16.4	2	64	60	4	8	14.4
-4.300	16.4	2	65	60	5	8	13.4
-4.250	16.4	2	65	60	5	8	13.4
-4.200	16.4	2	65	60	5	8	13.4
-4.150	16.4	2	65	60	5	8	13.4
-4.100	16.4	2	65	60	5	8	13.4
-4.050	16.4	2	65	60	5	8	13.4
-4.000	16.4	2	65	60	5	8	13.4
-3.950	16.4	2	65	60	5	8	13.4
-3.900	16.4	2	65	60	5	8	13.4
-3.850	16.4	2	65	60	5	8	13.4

-3.800	16.4	2	65	60	5	8	13.4
-3.750	16.4	2	65	60	5	8	13.4
-3.700	16.4	2	65	60	5	8	13.4
-3.650	16.4	2	65	60	5	8	13.4
-3.600	16.4	2	66	60	6	8	12.4
-3.550	16.4	2	66	60	6	8	12.4
-3.500	16.4	2	66	60	6	8	12.4
-3.450	16.4	2	66	60	6	8	12.4
-3.400	16.4	2	66	60	6	8	12.4
-3.350	16.4	2	66	60	6	8	12.4
-3.300	16.4	2	66	60	6	8	12.4
-3.250	16.4	2	66	60	6	8	12.4
-3.200	16.4	2	66	60	6	8	12.4
-3.150	16.4	2	66	60	6	8	12.4
-3.100	16.4	2	66	60	6	8	12.4
-3.050	16.4	2	66	60	6	8	12.4
-3.000	16.4	2	66	60	6	8	12.4
-2.950	16.4	2	66	60	6	8	12.4
-2.900	16.4	2	66	60	6	8	12.4
-2.850	16.4	2	66	60	6	8	12.4
-2.800	16.4	2	66	60	6	8	12.4
-2.750	16.4	2	66	60	6	8	12.4
-2.700	16.4	2	66	60	6	8	12.4
-2.650	16.4	2	66	60	6	8	12.4
-2.600	16.4	2	66	60	6	8	12.4
-2.550	16.4	2	66	60	6	8	12.4
-2.500	16.4	2	66	60	6	8	12.4
-2.450	16.4	2	67	60	7	8	11.4
-2.400	16.4	2	67	60	7	8	11.4
-2.350	16.4	2	67	60	7	8	11.4
-2.300	16.4	2	67	60	7	8	11.4
-2.250	16.4	2	67	60	7	8	11.4
-2.200	16.4	2	67	60	7	8	11.4
-2.150	16.4	2	67	60	7	8	11.4
-2.100	16.4	2	67	60	7	8	11.4
-2.050	16.4	2	67	60	7	8	11.4
-2.000	16.4	2	67	60	7	8	11.4
-1.950	16.4	2	67	60	7	8	11.4
-1.900	16.4	2	67	60	7	8	11.4
-1.850	16.4	2	67	60	7	8	11.4
-1.800	16.4	2	67	60	7	8	11.4
-1.750	16.4	2	67	60	7	8	11.4
-1.700	16.4	2	67	60	7	8	11.4
-1.650	16.4	2	67	60	7	8	11.4
-1.600	16.4	2	67	60	7	8	11.4
-1.550	16.4	2	67	60	7	8	11.4
-1.500	16.4	2	67	60	7	8	11.4
-1.450	16.4	2	67	60	7	8	11.4
-1.400	16.4	2	67	60	7	8	11.4
-1.350	16.4	2	67	60	7	8	11.4

-1.300	16.4	2	67	60	7	8	11.4
-1.250	16.4	2	67	60	7	8	11.4
-1.200	16.4	2	67	60	7	8	11.4
-1.150	16.4	2	67	60	7	8	11.4
-1.100	16.4	2	67	60	7	8	11.4
-1.050	16.4	2	67	60	7	8	11.4
-1.000	16.4	2	67	60	7	8	11.4
-0.950	16.4	2	67	60	7	8	11.4
-0.900	16.4	2	67	60	7	8	11.4
-0.850	16.4	2	67	60	7	8	11.4
-0.800	16.4	2	67	60	7	8	11.4
-0.750	16.4	2	67	60	7	8	11.4
-0.700	16.4	2	67	60	7	8	11.4
-0.650	16.4	2	67	60	7	8	11.4
-0.600	16.4	2	67	60	7	8	11.4
-0.550	16.4	2	67	60	7	8	11.4
-0.500	16.4	2	67	60	7	8	11.4
-0.450	16.4	2	68	60	8	8	10.4
-0.400	16.4	2	68	60	8	8	10.4
-0.350	16.4	2	68	60	8	8	10.4
-0.300	16.4	2	68	60	8	8	10.4
-0.250	16.4	2	68	60	8	8	10.4
-0.200	16.4	2	68	60	8	8	10.4
-0.150	16.4	2	68	60	8	8	10.4
-0.100	16.4	2	68	60	8	8	10.4
-0.050	16.4	2	68	60	8	8	10.4
Fc 2437.00MHz	16.4	2	68	60	8	8	10.4
0.050	16.4	2	68	60	8	8	10.4
0.100	16.4	2	68	60	8	8	10.4
0.150	16.4	2	68	60	8	8	10.4
0.200	16.4	2	68	60	8	8	10.4
0.250	16.4	2	68	60	8	8	10.4
0.300	16.4	2	68	60	8	8	10.4
0.350	16.4	2	68	60	8	8	10.4
0.400	16.4	2	68	60	8	8	10.4
0.450	16.4	2	68	60	8	8	10.4
0.500	16.4	2	68	60	8	8	10.4
0.550	16.4	2	68	60	8	8	10.4
0.600	16.4	2	67	60	7	8	11.4
0.650	16.4	2	67	60	7	8	11.4
0.700	16.4	2	67	60	7	8	11.4
0.750	16.4	2	67	60	7	8	11.4
0.800	16.4	2	67	60	7	8	11.4
0.850	16.4	2	67	60	7	8	11.4
0.900	16.4	2	67	60	7	8	11.4
0.950	16.4	2	67	60	7	8	11.4
1.000	16.4	2	67	60	7	8	11.4
1.050	16.4	2	67	60	7	8	11.4
1.100	16.4	2	67	60	7	8	11.4
1.150	16.4	2	67	60	7	8	11.4

1.200	16.4	2	67	60	7	8	11.4
1.250	16.4	2	67	60	7	8	11.4
1.300	16.4	2	67	60	7	8	11.4
1.350	16.4	2	67	60	7	8	11.4
1.400	16.4	2	67	60	7	8	11.4
1.450	16.4	2	67	60	7	8	11.4
1.500	16.4	2	67	60	7	8	11.4
1.550	16.4	2	67	60	7	8	11.4
1.600	16.4	2	67	60	7	8	11.4
1.650	16.4	2	67	60	7	8	11.4
1.700	16.4	2	67	60	7	8	11.4
1.750	16.4	2	67	60	7	8	11.4
1.800	16.4	2	67	60	7	8	11.4
1.850	16.4	2	67	60	7	8	11.4
1.900	16.4	2	67	60	7	8	11.4
1.950	16.4	2	67	60	7	8	11.4
2.000	16.4	2	66	60	6	8	12.4
2.050	16.4	2	66	60	6	8	12.4
2.100	16.4	2	66	60	6	8	12.4
2.150	16.4	2	66	60	6	8	12.4
2.200	16.4	2	66	60	6	8	12.4
2.250	16.4	2	66	60	6	8	12.4
2.300	16.4	2	66	60	6	8	12.4
2.350	16.4	2	66	60	6	8	12.4
2.400	16.4	2	66	60	6	8	12.4
2.450	16.4	2	66	60	6	8	12.4
2.500	16.4	2	66	60	6	8	12.4
2.550	16.4	2	66	60	6	8	12.4
2.600	16.4	2	66	60	6	8	12.4
2.650	16.4	2	66	60	6	8	12.4
2.700	16.4	2	66	60	6	8	12.4
2.750	16.4	2	66	60	6	8	12.4
2.800	16.4	2	66	60	6	8	12.4
2.850	16.4	2	66	60	6	8	12.4
2.900	16.4	2	66	60	6	8	12.4
2.950	16.4	2	66	60	6	8	12.4
3.000	16.4	2	66	60	6	8	12.4
3.050	16.4	2	66	60	6	8	12.4
3.100	16.4	2	66	60	6	8	12.4
3.150	16.4	2	66	60	6	8	12.4
3.200	16.4	2	66	60	6	8	12.4
3.250	16.4	2	66	60	6	8	12.4
3.300	16.4	2	66	60	6	8	12.4
3.350	16.4	2	66	60	6	8	12.4
3.400	16.4	2	66	60	6	8	12.4
3.450	16.4	2	65	60	5	8	13.4
3.500	16.4	2	65	60	5	8	13.4
3.550	16.4	2	65	60	5	8	13.4
3.600	16.4	2	65	60	5	8	13.4
3.650	16.4	2	65	60	5	8	13.4

3.700	16.4	2	65	60	5	8	13.4
3.750	16.4	2	65	60	5	8	13.4
3.800	16.4	2	65	60	5	8	13.4
3.850	16.4	2	65	60	5	8	13.4
3.900	16.4	2	65	60	5	8	13.4
3.950	16.4	2	65	60	5	8	13.4
4.000	16.4	2	65	60	5	8	13.4
4.050	16.4	2	65	60	5	8	13.4
4.100	16.4	2	65	60	5	8	13.4
4.150	16.4	2	65	60	5	8	13.4
4.200	16.4	2	65	60	5	8	13.4
4.250	16.4	2	65	60	5	8	13.4
4.300	16.4	2	64	60	4	8	14.4
4.350	16.4	2	64	60	4	8	14.4
4.400	16.4	2	64	60	4	8	14.4
4.450	16.4	2	64	60	4	8	14.4
4.500	16.4	2	64	60	4	8	14.4
4.550	16.4	2	64	60	4	8	14.4
4.600	16.4	2	64	60	4	8	14.4
4.650	16.4	2	64	60	4	8	14.4
4.700	16.4	2	64	60	4	8	14.4
4.750	16.4	2	64	60	4	8	14.4
4.800	16.4	2	64	60	4	8	14.4
4.850	16.4	2	64	60	4	8	14.4
4.900	16.4	2	64	60	4	8	14.4
4.950	16.4	2	64	60	4	8	14.4
5.000	16.4	2	64	60	4	8	14.4
5.050	16.4	2	64	60	4	8	14.4
5.100	16.4	2	63	60	3	8	15.4
5.150	16.4	2	63	60	3	8	15.4
5.200	16.4	2	63	60	3	8	15.4
5.250	16.4	2	63	60	3	8	15.4
5.300	16.4	2	63	60	3	8	15.4
5.350	16.4	2	63	60	3	8	15.4
5.400	16.4	2	63	60	3	8	15.4
5.450	16.4	2	63	60	3	8	15.4
5.500	16.4	2	63	60	3	8	15.4
5.550	16.4	2	63	60	3	8	15.4
5.600	16.4	2	63	60	3	8	15.4
5.650	16.4	2	63	60	3	8	15.4
5.700	16.4	2	63	60	3	8	15.4
5.750	16.4	2	63	60	3	8	15.4
5.800	16.4	2	63	60	3	8	15.4
5.850	16.4	2	63	60	3	8	15.4
5.900	16.4	2	63	60	3	8	15.4
5.950	16.4	2	63	60	3	8	15.4
6.000	16.4	2	63	60	3	8	15.4
6.050	16.4	2	63	60	3	8	15.4
6.100	16.4	2	63	60	3	8	15.4
6.150	16.4	2	63	60	3	8	15.4

6.200	16.4	2	63	60	3	8	15.4
6.250	16.4	2	63	60	3	8	15.4
6.300	16.4	2	63	60	3	8	15.4
6.350	16.4	2	63	60	3	8	15.4
6.400	16.4	2	63	60	3	8	15.4
6.450	16.4	2	63	60	3	8	15.4
6.500	16.4	2	63	60	3	8	15.4
6.550	16.4	2	63	60	3	8	15.4
6.600	16.4	2	63	60	3	8	15.4
6.650	16.4	2	63	60	3	8	15.4
6.700	16.4	2	63	60	3	8	15.4
6.750	16.4	2	63	60	3	8	15.4
6.800	16.4	2	63	60	3	8	15.4
6.850	16.4	2	63	60	3	8	15.4
6.900	16.4	2	63	60	3	8	15.4
6.950	16.4	2	63	60	3	8	15.4
7.000	16.4	2	63	60	3	8	15.4
7.050	16.4	2	63	60	3	8	15.4
7.100	16.4	2	63	60	3	8	15.4
7.150	16.4	2	63	60	3	8	15.4
7.200	16.4	2	63	60	3	8	15.4
7.250	16.4	2	63	60	3	8	15.4
7.300	16.4	2	63	60	3	8	15.4
7.350	16.4	2	63	60	3	8	15.4
7.400	16.4	2	63	60	3	8	15.4
7.450	16.4	2	63	60	3	8	15.4
7.500	16.4	2	63	60	3	8	15.4
7.550	16.4	2	63	60	3	8	15.4
7.600	16.4	2	63	60	3	8	15.4
7.650	16.4	2	63	60	3	8	15.4
7.700	16.4	2	63	60	3	8	15.4
7.750	16.4	2	63	60	3	8	15.4
7.800	16.4	2	63	60	3	8	15.4
7.850	16.4	2	63	60	3	8	15.4
7.900	16.4	2	63	60	3	8	15.4
7.950	16.4	2	63	60	3	8	15.4
8.000	16.4	2	63	60	3	8	15.4
8.050	16.4	2	63	60	3	8	15.4
8.100	16.4	2	63	60	3	8	15.4
8.150	16.4	2	63	60	3	8	15.4
8.200	16.4	2	63	60	3	8	15.4
8.250	16.4	2	63	60	3	8	15.4
8.300	16.4	2	63	60	3	8	15.4
8.350	16.4	2	63	60	3	8	15.4
8.400	16.4	2	63	60	3	8	15.4
8.450	16.4	2	63	60	3	8	15.4
8.500	16.4	2	63	60	3	8	15.4

Test result for CH 11 Center frequency (Fc)=2.462 GHz

SSG- CW Jammer Fc+/- MHz	Es/No (dB)	L system (dB)	Jam Level (-dBm)	Signal pwr (-dBm)	J/S (-dB)	PER (%)	Gp (process gain) (dB)
-8.500	16.4	2	62	60	2	8	16.4
-8.450	16.4	2	62	60	2	8	16.4
-8.400	16.4	2	62	60	2	8	16.4
-8.350	16.4	2	62	60	2	8	16.4
-8.300	16.4	2	62	60	2	8	16.4
-8.250	16.4	2	62	60	2	8	16.4
-8.200	16.4	2	62	60	2	8	16.4
-8.150	16.4	2	62	60	2	8	16.4
-8.100	16.4	2	62	60	2	8	16.4
-8.050	16.4	2	62	60	2	8	16.4
-8.000	16.4	2	62	60	2	8	16.4
-7.950	16.4	2	62	60	2	8	16.4
-7.900	16.4	2	62	60	2	8	16.4
-7.850	16.4	2	62	60	2	8	16.4
-7.800	16.4	2	62	60	2	8	16.4
-7.750	16.4	2	62	60	2	8	16.4
-7.700	16.4	2	62	60	2	8	16.4
-7.650	16.4	2	62	60	2	8	16.4
-7.600	16.4	2	62	60	2	8	16.4
-7.550	16.4	2	62	60	2	8	16.4
-7.500	16.4	2	62	60	2	8	16.4
-7.450	16.4	2	62	60	2	8	16.4
-7.400	16.4	2	62	60	2	8	16.4
-7.350	16.4	2	62	60	2	8	16.4
-7.300	16.4	2	62	60	2	8	16.4
-7.250	16.4	2	62	60	2	8	16.4
-7.200	16.4	2	62	60	2	8	16.4
-7.150	16.4	2	62	60	2	8	16.4
-7.100	16.4	2	62	60	2	8	16.4
-7.050	16.4	2	62	60	2	8	16.4
-7.000	16.4	2	62	60	2	8	16.4
-6.950	16.4	2	62	60	2	8	16.4
-6.900	16.4	2	62	60	2	8	16.4
-6.850	16.4	2	62	60	2	8	16.4
-6.800	16.4	2	62	60	2	8	16.4
-6.750	16.4	2	62	60	2	8	16.4
-6.700	16.4	2	62	60	2	8	16.4
-6.650	16.4	2	62	60	2	8	16.4
-6.600	16.4	2	62	60	2	8	16.4
-6.550	16.4	2	62	60	2	8	16.4
-6.500	16.4	2	62	60	2	8	16.4
-6.450	16.4	2	62	60	2	8	16.4
-6.400	16.4	2	62	60	2	8	16.4
-6.350	16.4	2	62	60	2	8	16.4

-6.300	16.4	2	63	60	3	8	15.4
-6.250	16.4	2	63	60	3	8	15.4
-6.200	16.4	2	63	60	3	8	15.4
-6.150	16.4	2	63	60	3	8	15.4
-6.100	16.4	2	63	60	3	8	15.4
-6.050	16.4	2	63	60	3	8	15.4
-6.000	16.4	2	63	60	3	8	15.4
-5.950	16.4	2	63	60	3	8	15.4
-5.900	16.4	2	63	60	3	8	15.4
-5.850	16.4	2	63	60	3	8	15.4
-5.800	16.4	2	63	60	3	8	15.4
-5.750	16.4	2	63	60	3	8	15.4
-5.700	16.4	2	63	60	3	8	15.4
-5.650	16.4	2	63	60	3	8	15.4
-5.600	16.4	2	63	60	3	8	15.4
-5.550	16.4	2	63	60	3	8	15.4
-5.500	16.4	2	64	60	4	8	14.4
-5.450	16.4	2	64	60	4	8	14.4
-5.400	16.4	2	64	60	4	8	14.4
-5.350	16.4	2	64	60	4	8	14.4
-5.300	16.4	2	64	60	4	8	14.4
-5.250	16.4	2	64	60	4	8	14.4
-5.200	16.4	2	64	60	4	8	14.4
-5.150	16.4	2	64	60	4	8	14.4
-5.100	16.4	2	64	60	4	8	14.4
-5.050	16.4	2	64	60	4	8	14.4
-5.000	16.4	2	64	60	4	8	14.4
-4.950	16.4	2	64	60	4	8	14.4
-4.900	16.4	2	64	60	4	8	14.4
-4.850	16.4	2	65	60	5	8	13.4
-4.800	16.4	2	65	60	5	8	13.4
-4.750	16.4	2	65	60	5	8	13.4
-4.700	16.4	2	65	60	5	8	13.4
-4.650	16.4	2	65	60	5	8	13.4
-4.600	16.4	2	65	60	5	8	13.4
-4.550	16.4	2	65	60	5	8	13.4
-4.500	16.4	2	65	60	5	8	13.4
-4.450	16.4	2	65	60	5	8	13.4
-4.400	16.4	2	65	60	5	8	13.4
-4.350	16.4	2	65	60	5	8	13.4
-4.300	16.4	2	65	60	5	8	13.4
-4.250	16.4	2	65	60	5	8	13.4
-4.200	16.4	2	65	60	5	8	13.4
-4.150	16.4	2	65	60	5	8	13.4
-4.100	16.4	2	65	60	5	8	13.4
-4.050	16.4	2	66	60	6	8	12.4
-4.000	16.4	2	66	60	6	8	12.4
-3.950	16.4	2	66	60	6	8	12.4
-3.900	16.4	2	66	60	6	8	12.4
-3.850	16.4	2	66	60	6	8	12.4

-3.800	16.4	2	66	60	6	8	12.4
-3.750	16.4	2	66	60	6	8	12.4
-3.700	16.4	2	66	60	6	8	12.4
-3.650	16.4	2	66	60	6	8	12.4
-3.600	16.4	2	66	60	6	8	12.4
-3.550	16.4	2	66	60	6	8	12.4
-3.500	16.4	2	66	60	6	8	12.4
-3.450	16.4	2	66	60	6	8	12.4
-3.400	16.4	2	66	60	6	8	12.4
-3.350	16.4	2	66	60	6	8	12.4
-3.300	16.4	2	66	60	6	8	12.4
-3.250	16.4	2	66	60	6	8	12.4
-3.200	16.4	2	66	60	6	8	12.4
-3.150	16.4	2	66	60	6	8	12.4
-3.100	16.4	2	66	60	6	8	12.4
-3.050	16.4	2	66	60	6	8	12.4
-3.000	16.4	2	66	60	6	8	12.4
-2.950	16.4	2	66	60	6	8	12.4
-2.900	16.4	2	66	60	6	8	12.4
-2.850	16.4	2	66	60	6	8	12.4
-2.800	16.4	2	66	60	6	8	12.4
-2.750	16.4	2	66	60	6	8	12.4
-2.700	16.4	2	66	60	6	8	12.4
-2.650	16.4	2	66	60	6	8	12.4
-2.600	16.4	2	66	60	6	8	12.4
-2.550	16.4	2	66	60	6	8	12.4
-2.500	16.4	2	66	60	6	8	12.4
-2.450	16.4	2	67	60	7	8	11.4
-2.400	16.4	2	67	60	7	8	11.4
-2.350	16.4	2	67	60	7	8	11.4
-2.300	16.4	2	67	60	7	8	11.4
-2.250	16.4	2	67	60	7	8	11.4
-2.200	16.4	2	67	60	7	8	11.4
-2.150	16.4	2	67	60	7	8	11.4
-2.100	16.4	2	67	60	7	8	11.4
-2.050	16.4	2	67	60	7	8	11.4
-2.000	16.4	2	67	60	7	8	11.4
-1.950	16.4	2	67	60	7	8	11.4
-1.900	16.4	2	67	60	7	8	11.4
-1.850	16.4	2	67	60	7	8	11.4
-1.800	16.4	2	67	60	7	8	11.4
-1.750	16.4	2	67	60	7	8	11.4
-1.700	16.4	2	67	60	7	8	11.4
-1.650	16.4	2	67	60	7	8	11.4
-1.600	16.4	2	67	60	7	8	11.4
-1.550	16.4	2	67	60	7	8	11.4
-1.500	16.4	2	67	60	7	8	11.4
-1.450	16.4	2	67	60	7	8	11.4
-1.400	16.4	2	67	60	7	8	11.4
-1.350	16.4	2	67	60	7	8	11.4

-1.300	16.4	2	67	60	7	8	11.4
-1.250	16.4	2	67	60	7	8	11.4
-1.200	16.4	2	67	60	7	8	11.4
-1.150	16.4	2	67	60	7	8	11.4
-1.100	16.4	2	67	60	7	8	11.4
-1.050	16.4	2	67	60	7	8	11.4
-1.000	16.4	2	67	60	7	8	11.4
-0.950	16.4	2	67	60	7	8	11.4
-0.900	16.4	2	67	60	7	8	11.4
-0.850	16.4	2	67	60	7	8	11.4
-0.800	16.4	2	67	60	7	8	11.4
-0.750	16.4	2	67	60	7	8	11.4
-0.700	16.4	2	67	60	7	8	11.4
-0.650	16.4	2	67	60	7	8	11.4
-0.600	16.4	2	67	60	7	8	11.4
-0.550	16.4	2	67	60	7	8	11.4
-0.500	16.4	2	67	60	7	8	11.4
-0.450	16.4	2	68	60	8	8	10.4
-0.400	16.4	2	67	60	7	8	11.4
-0.350	16.4	2	67	60	7	8	11.4
-0.300	16.4	2	68	60	8	8	10.4
-0.250	16.4	2	68	60	8	8	10.4
-0.200	16.4	2	68	60	8	8	10.4
-0.150	16.4	2	68	60	8	8	10.4
-0.100	16.4	2	68	60	8	8	10.4
-0.050	16.4	2	68	60	8	8	10.4
Fc 2462.00MHz	16.4	2	68	60	8	8	10.4
0.050	16.4	2	68	60	8	8	10.4
0.100	16.4	2	68	60	8	8	10.4
0.150	16.4	2	68	60	8	8	10.4
0.200	16.4	2	68	60	8	8	10.4
0.250	16.4	2	68	60	8	8	10.4
0.300	16.4	2	68	60	8	8	10.4
0.350	16.4	2	68	60	8	8	10.4
0.400	16.4	2	68	60	8	8	10.4
0.450	16.4	2	68	60	8	8	10.4
0.500	16.4	2	67	60	7	8	11.4
0.550	16.4	2	67	60	7	8	11.4
0.600	16.4	2	67	60	7	8	11.4
0.650	16.4	2	67	60	7	8	11.4
0.700	16.4	2	68	60	8	8	10.4
0.750	16.4	2	67	60	7	8	11.4
0.800	16.4	2	67	60	7	8	11.4
0.850	16.4	2	67	60	7	8	11.4
0.900	16.4	2	67	60	7	8	11.4
0.950	16.4	2	67	60	7	8	11.4
1.000	16.4	2	67	60	7	8	11.4
1.050	16.4	2	67	60	7	8	11.4
1.100	16.4	2	67	60	7	8	11.4
1.150	16.4	2	67	60	7	8	11.4

1.200	16.4	2	67	60	7	8	11.4
1.250	16.4	2	67	60	7	8	11.4
1.300	16.4	2	67	60	7	8	11.4
1.350	16.4	2	67	60	7	8	11.4
1.400	16.4	2	67	60	7	8	11.4
1.450	16.4	2	67	60	7	8	11.4
1.500	16.4	2	67	60	7	8	11.4
1.550	16.4	2	67	60	7	8	11.4
1.600	16.4	2	67	60	7	8	11.4
1.650	16.4	2	67	60	7	8	11.4
1.700	16.4	2	67	60	7	8	11.4
1.750	16.4	2	67	60	7	8	11.4
1.800	16.4	2	67	60	7	8	11.4
1.850	16.4	2	67	60	7	8	11.4
1.900	16.4	2	67	60	7	8	11.4
1.950	16.4	2	67	60	7	8	11.4
2.000	16.4	2	67	60	7	8	11.4
2.050	16.4	2	67	60	7	8	11.4
2.100	16.4	2	67	60	7	8	11.4
2.150	16.4	2	67	60	7	8	11.4
2.200	16.4	2	67	60	7	8	11.4
2.250	16.4	2	67	60	7	8	11.4
2.300	16.4	2	66	60	6	8	12.4
2.350	16.4	2	66	60	6	8	12.4
2.400	16.4	2	66	60	6	8	12.4
2.450	16.4	2	66	60	6	8	12.4
2.500	16.4	2	66	60	6	8	12.4
2.550	16.4	2	66	60	6	8	12.4
2.600	16.4	2	66	60	6	8	12.4
2.650	16.4	2	66	60	6	8	12.4
2.700	16.4	2	66	60	6	8	12.4
2.750	16.4	2	66	60	6	8	12.4
2.800	16.4	2	66	60	6	8	12.4
2.850	16.4	2	66	60	6	8	12.4
2.900	16.4	2	66	60	6	8	12.4
2.950	16.4	2	66	60	6	8	12.4
3.000	16.4	2	65	60	5	8	13.4
3.050	16.4	2	65	60	5	8	13.4
3.100	16.4	2	65	60	5	8	13.4
3.150	16.4	2	65	60	5	8	13.4
3.200	16.4	2	65	60	5	8	13.4
3.250	16.4	2	65	60	5	8	13.4
3.300	16.4	2	65	60	5	8	13.4
3.350	16.4	2	65	60	5	8	13.4
3.400	16.4	2	65	60	5	8	13.4
3.450	16.4	2	65	60	5	8	13.4
3.500	16.4	2	65	60	5	8	13.4
3.550	16.4	2	65	60	5	8	13.4
3.600	16.4	2	65	60	5	8	13.4
3.650	16.4	2	65	60	5	8	13.4

3.700	16.4	2	65	60	5	8	13.4
3.750	16.4	2	65	60	5	8	13.4
3.800	16.4	2	65	60	5	8	13.4
3.850	16.4	2	65	60	5	8	13.4
3.900	16.4	2	65	60	5	8	13.4
3.950	16.4	2	65	60	5	8	13.4
4.000	16.4	2	65	60	5	8	13.4
4.050	16.4	2	65	60	5	8	13.4
4.100	16.4	2	65	60	5	8	13.4
4.150	16.4	2	65	60	5	8	13.4
4.200	16.4	2	65	60	5	8	13.4
4.250	16.4	2	65	60	5	8	13.4
4.300	16.4	2	65	60	5	8	13.4
4.350	16.4	2	65	60	5	8	13.4
4.400	16.4	2	65	60	5	8	13.4
4.450	16.4	2	65	60	5	8	13.4
4.500	16.4	2	65	60	5	8	13.4
4.550	16.4	2	64	60	4	8	14.4
4.600	16.4	2	64	60	4	8	14.4
4.650	16.4	2	64	60	4	8	14.4
4.700	16.4	2	64	60	4	8	14.4
4.750	16.4	2	64	60	4	8	14.4
4.800	16.4	2	64	60	4	8	14.4
4.850	16.4	2	64	60	4	8	14.4
4.900	16.4	2	64	60	4	8	14.4
4.950	16.4	2	64	60	4	8	14.4
5.000	16.4	2	64	60	4	8	14.4
5.050	16.4	2	64	60	4	8	14.4
5.100	16.4	2	64	60	4	8	14.4
5.150	16.4	2	64	60	4	8	14.4
5.200	16.4	2	64	60	4	8	14.4
5.250	16.4	2	64	60	4	8	14.4
5.300	16.4	2	64	60	4	8	14.4
5.350	16.4	2	64	60	4	8	14.4
5.400	16.4	2	64	60	4	8	14.4
5.450	16.4	2	63	60	3	8	15.4
5.500	16.4	2	63	60	3	8	15.4
5.550	16.4	2	63	60	3	8	15.4
5.600	16.4	2	63	60	3	8	15.4
5.650	16.4	2	63	60	3	8	15.4
5.700	16.4	2	63	60	3	8	15.4
5.750	16.4	2	63	60	3	8	15.4
5.800	16.4	2	63	60	3	8	15.4
5.850	16.4	2	63	60	3	8	15.4
5.900	16.4	2	63	60	3	8	15.4
5.950	16.4	2	63	60	3	8	15.4
6.000	16.4	2	63	60	3	8	15.4
6.050	16.4	2	63	60	3	8	15.4
6.100	16.4	2	63	60	3	8	15.4
6.150	16.4	2	63	60	3	8	15.4

6.200	16.4	2	63	60	3	8	15.4
6.250	16.4	2	63	60	3	8	15.4
6.300	16.4	2	63	60	3	8	15.4
6.350	16.4	2	63	60	3	8	15.4
6.400	16.4	2	63	60	3	8	15.4
6.450	16.4	2	63	60	3	8	15.4
6.500	16.4	2	63	60	3	8	15.4
6.550	16.4	2	63	60	3	8	15.4
6.600	16.4	2	63	60	3	8	15.4
6.650	16.4	2	63	60	3	8	15.4
6.700	16.4	2	63	60	3	8	15.4
6.750	16.4	2	63	60	3	8	15.4
6.800	16.4	2	63	60	3	8	15.4
6.850	16.4	2	63	60	3	8	15.4
6.900	16.4	2	63	60	3	8	15.4
6.950	16.4	2	63	60	3	8	15.4
7.000	16.4	2	63	60	3	8	15.4
7.050	16.4	2	63	60	3	8	15.4
7.100	16.4	2	63	60	3	8	15.4
7.150	16.4	2	63	60	3	8	15.4
7.200	16.4	2	63	60	3	8	15.4
7.250	16.4	2	63	60	3	8	15.4
7.300	16.4	2	63	60	3	8	15.4
7.350	16.4	2	63	60	3	8	15.4
7.400	16.4	2	63	60	3	8	15.4
7.450	16.4	2	63	60	3	8	15.4
7.500	16.4	2	63	60	3	8	15.4
7.550	16.4	2	63	60	3	8	15.4
7.600	16.4	2	63	60	3	8	15.4
7.650	16.4	2	63	60	3	8	15.4
7.700	16.4	2	63	60	3	8	15.4
7.750	16.4	2	63	60	3	8	15.4
7.800	16.4	2	63	60	3	8	15.4
7.850	16.4	2	63	60	3	8	15.4
7.900	16.4	2	63	60	3	8	15.4
7.950	16.4	2	63	60	3	8	15.4
8.000	16.4	2	63	60	3	8	15.4
8.050	16.4	2	63	60	3	8	15.4
8.100	16.4	2	63	60	3	8	15.4
8.150	16.4	2	63	60	3	8	15.4
8.200	16.4	2	63	60	3	8	15.4
8.250	16.4	2	63	60	3	8	15.4
8.300	16.4	2	63	60	3	8	15.4
8.350	16.4	2	63	60	3	8	15.4
8.400	16.4	2	63	60	3	8	15.4
8.450	16.4	2	63	60	3	8	15.4
8.500	16.4	2	63	60	3	8	15.4