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Test Report of
SkyWay
FCC Processing Gain Measurement

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1 CW Jamming Margin Test Method

1.1 Theory of test and processing gain formula

The processing gain is measured using the continuous wave (CW) jamming margin method, performed under the guidance of the FCC rules, Part 15.247(e). A signal generator is used to inject a jammer into an established unidirectional system link. The test consists of stepping the signal generator across the passband of the system in 50kHz increments. At each point the jammer power required to degrade the system to a 1 x 10^{-5} Bit Error Rate (BER) is recorded as the Jammer signal level (J). The output power of the system transmitter is measured and recorded as the desired Signal level (S). The Jammer to Signal ratio (J/S) is then calculated at each interval within the passband. 20% of the worst (lowest) data points are discarded as permitted by the FCC. The lowest remaining J/S ratio is used to calculate the processing gain (G_P) using the following formula:

$$G_P = \frac{E_S}{N_0} + M_J + L_{SYS}$$

E_S/N_0 = **Required energy per symbol - to - noise ratio**
M_J = **Jamming margin, or J/S ratio**
L_{SYS} = **System implementation loss**

The minimum required processing gain required by the FCC is **10dB**.

1.2 E_S/N_0 requirement

The SkyWay transceiver implements the Prism II chipset from Intersil. At the 11Mbit/s data rate M-ary Bi-orthogonal Keying (MBOK) or Complementary Code Keying (CCK) modulation is used. Intersil's datasheet for the Prism II baseband processor details its implementation of the higher data rate modulation schemes (Part number HFA3860B, File Number 4594). Figure 1 shows the theoretical (THY) and practical (BER) curves for MBOK/CCK modulation modes at 5.5 and 11Mbit/s. These performance curves are referenced from Intersil's documented specifications.

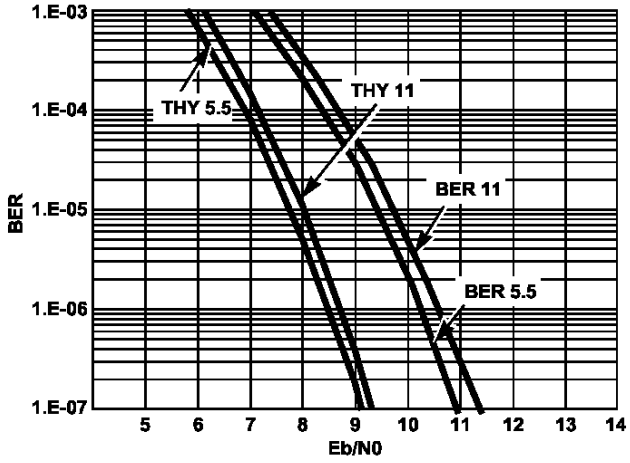

Figure 1 - BER vs. E_B/N_0 Performance for MBOK/CCK Modulation

The required theoretical E_B/N_0 is 8dB for a $1x10^{-5}$ reference BER. Each symbol codes 8 bits in both MBOK and CCK modulation at 11Mbit/s. Therefore the corresponding E_S/N_0 is 8 times higher than the E_B/N_0 for a desired BER:

$$\frac{E_S}{N_0}(dB) = \frac{E_B}{N_0}(dB) + 10Log(n_{bits})$$

$$E_B/N_0 = 8dB \text{ (for MBOK/CCK modulation at } 1x10^{-5} \text{ BER)}$$
$$n_{bits} = 8 \text{ (bits per coded symbol)}$$

The required E_S/N_0 for a BER of $1x10^{-5}$ is **17dB**.

1.3 Permitted system implementation loss

The FCC allows for **2dB** of system implementation loss (L_{SYS}) for practical limitations that degrade the performance below that of an optimum theoretical system.

1.4 Minimum allowable J/S ratio

Given the above requirements, the minimum allowable jamming margin (M_J) for the system is calculated:

$$G_P = 17dB + M_J + 2dB \geq 10dB$$
$$\Rightarrow \quad M_J \geq -9dB$$

The minimum allowable Jamming to Signal level (J/S) is **–9dB**.

2 Test Setup

2.1 List of test equipment

Description	Brand	Part Number
Synthesized Signal Generator, 10MHz – 20GHz	Hewlett Packard	83732A
Peak Power Sensor, 100MHz – 18GHz	Hewlett Packard	84811A
Peak Power Meter	Hewlett Packard	8900D
Spectrum Analyzer, 9KHz – 6.5GHz	Hewlett Packard	8595E
2-Way Reactive Power Splitter/Combiner	Mini-Circuits	ZFSC-2-10G
4-Way Reactive Power Splitter/Combiner	Mini-Circuits	ZA4PD-2
11dB/1W Adjustable Attenuator, DC – 4GHz	Hewlett Packard	8494A
110dB/1W Adjustable Attenuator, DC – 4GHz	Hewlett Packard	8496A
10dB/2W Power Attenuator (x3)	Mini-Circuits	MCLBW-S10W2
10dB/2W Power Attenuator (x4)	Alan Microwave	50SP10
50Ω/2W Termination	Pasternack	PE6009

2.2 Setup diagram and description

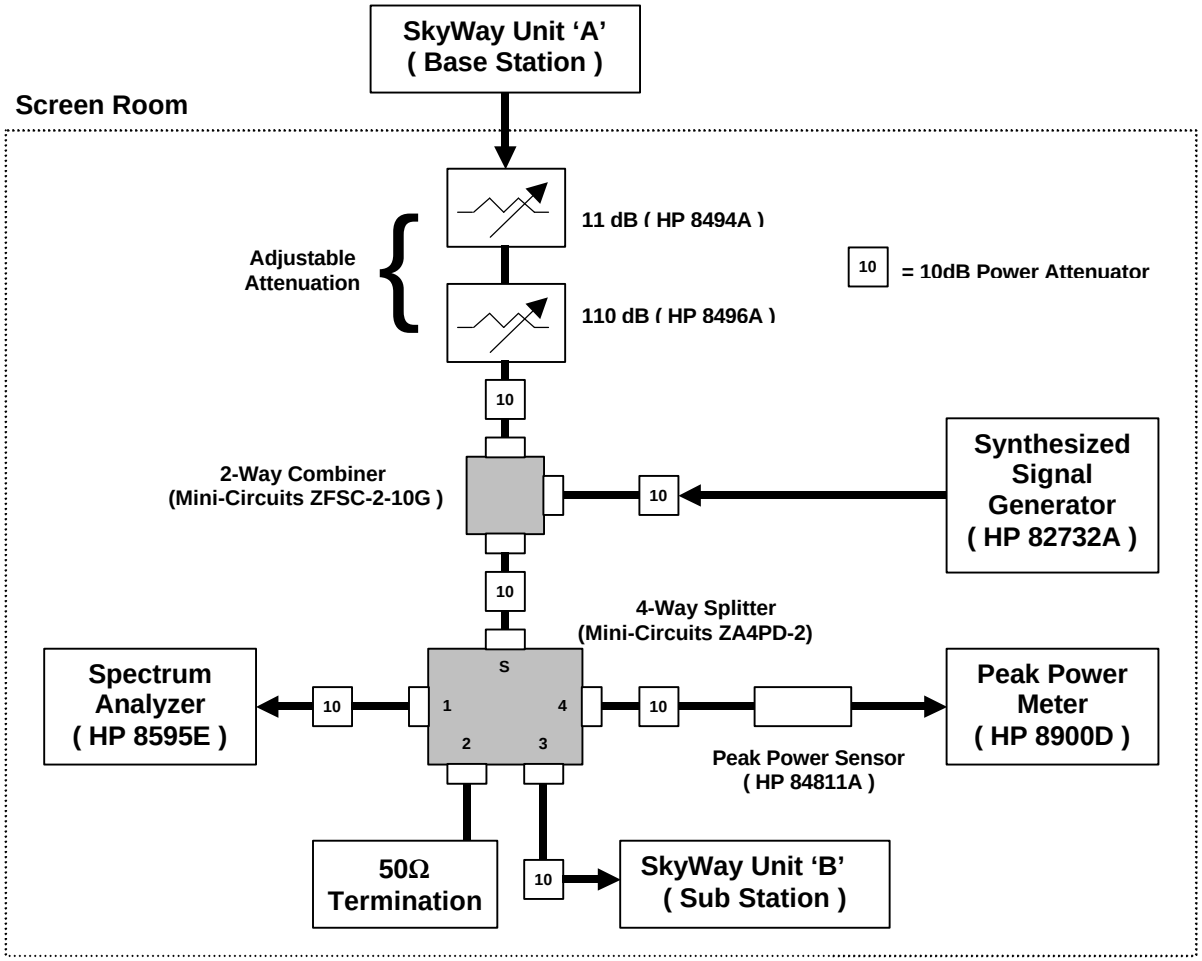

Figure 2 – Equipment Setup

Two identical SkyWay units are used. SkyWay unit 'A' is configured by software to act as the Base station, while unit 'B' is configured as the Sub station. Both units will be running RF-Data Link Control diagnostic software in continuous single frame transmit/receive mode. In this mode, the Base will be continuously transmitting 1530 byte frames at 11Mbit/s. The Sub will receive and process these frames, using counters to display the number of frames and bytes received without error. The software will also keep track of the number and types of errors it finds in the received data. All the equipment except the Base station is contained within a screen room during the test.

The CW jammer is injected into the link using a reactive combiner. The combined signals are then distributed equally between the Sub station, Spectrum Analyzer, and Peak Power Meter. Any differences in the actual power presented at the input ports of the three devices are noted across the system passband. These calibration factors are taken into account when actual measurements are made.

The output power of the Base station is adjusted to a nominal value of 20dBm. The adjustable attenuators are then set so that the power of the desired signal at the Sub station input port is –60dBm.

10dB attenuating pads are placed on all ports of the reactive splitters/combiners. This provides a good VSWR to each port and minimizes component interaction within the test setup.

Appropriate low-loss, shielded coaxial cables are used to interconnect the components of the test setup.

2.3 Measurement procedure

The maximum 6dB bandwidth of the system is 12MHz. At each 50kHz interval within this band, a measurement is made to determine the Jamming signal to desired Signal ratio (J/S). An error free link is first established with the power of the desired signal calibrated to –60dBm at the Sub station input port. The jammer signal is then introduced at a level low enough such that no receive errors result from it. The jamming signal is then increased at 0.1dB intervals until the Bit Error Rate (BER) degrades to $1x10^{-5}$. This is determined by monitoring the counters for received bytes and errors. For greater accuracy, 1000 frames are sampled, with 1530 bytes constituting one frame. 1.53 million bytes received with 122 errors or less corresponds to a minimum BER of $1x10^{-5}$:

$$BER \equiv \frac{n_{errors}}{1000\,\text{frames} \times 1530\,\text{bytes} \times 8\text{bits}} \leq 10^{-5}$$

$$\Rightarrow \quad n_{errors} \leq 122.4$$

Once the minimum BER is achieved, the desired signal is momentarily disabled and the power of the Jamming signal at the Sub station input port is measured. The measurements have been tabulated in Section 0.

2.4 Photographs of test setup

Figure 3 - Base station setup (PC & Skyway unit)

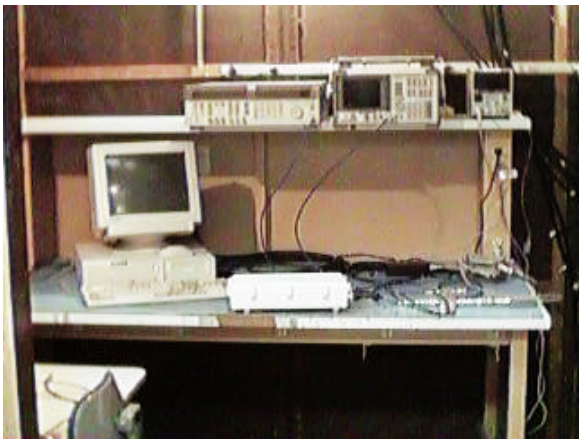

Figure 4 - Sub station setup (PC & SkyWay unit) with test equipment

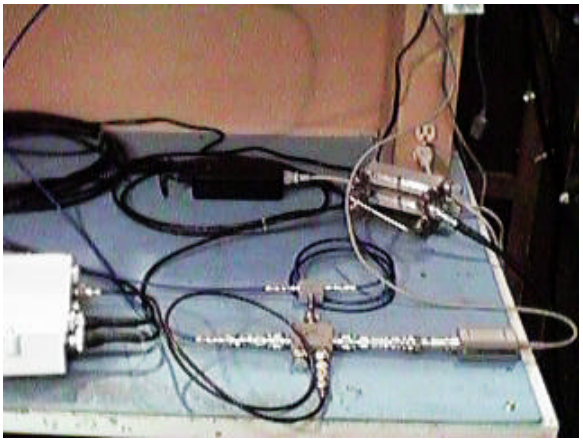

Figure 5 - Setup of attenuators, splitter, and combiner

3 Test Results

3.1 Data tables

System Bandwidth = f_{center} ± 6MHz (6000kHz = 120 x 50kHz)
System Channel = 2442MHz

Frequency (MHz)	Frequency Offset (kHz)	J (dBm)	S (dBm)	J/S (dB)
2436.00	-120 x 50	-66.3	-60.1	-6.2
2436.05	-119 x 50	-66.3	-60.1	-6.2
2436.10	-118 x 50	-66.4	-60.1	-6.3
2436.15	-117 x 50	-66.8	-60.1	-6.7
2436.20	-116 x 50	-66.4	-60.1	-6.3
2436.25	-115 x 50	-66.5	-60.1	-6.4
2436.30	-114 x 50	-66.6	-60.1	-6.5
2436.35	-113 x 50	-67.0	-60.1	-6.9
2436.40	-112 x 50	-66.8	-60.1	-6.7
2436.45	-111 x 50	-66.8	-60.1	-6.7
2436.50	-110 x 50	-66.7	-60.1	-6.6
2436.55	-109 x 50	-66.6	-60.1	-6.5
2436.60	-108 x 50	-66.9	-60.1	-6.8
2436.65	-107 x 50	-66.8	-60.1	-6.7
2436.70	-106 x 50	-66.6	-60.1	-6.5
2436.75	-105 x 50	-66.7	-60.1	-6.6
2436.80	-104 x 50	-66.8	-60.1	-6.7
2436.85	-103 x 50	-66.6	-60.1	-6.5
2436.90	-102 x 50	-66.5	-60.1	-6.4
2436.95	-101 x 50	-66.4	-60.1	-6.3
2437.00	-100 x 50	-66.4	-60.1	-6.3
2437.05	-99 x 50	-66.5	-60.1	-6.4
2437.10	-98 x 50	-66.5	-60.1	-6.4
2437.15	-97 x 50	-66.4	-60.1	-6.3
2437.20	-96 x 50	-66.2	-60.1	-6.1
2437.25	-95 x 50	-66.2	-60.1	-6.1
2437.30	-94 x 50	-66.2	-60.1	-6.1
2437.35	-93 x 50	-66.3	-60.1	-6.2
2437.40	-92 x 50	-66.2	-60.1	-6.1
2437.45	-91 x 50	-66.2	-60.1	-6.1
2437.50	-90 x 50	-66.0	-60.1	-5.9
2437.55	-89 x 50	-65.8	-60.1	-5.7
2437.60	-88 x 50	-66.1	-60.1	-6.0
2437.65	-87 x 50	-65.9	-60.1	-5.8
2437.70	-86 x 50	-65.7	-60.1	-5.6
2437.75	-85 x 50	-65.7	-60.1	-5.6
2437.80	-84 x 50	-65.7	-60.1	-5.6
2437.85	-83 x 50	-65.7	-60.1	-5.6
2437.90	-82 x 50	-65.7	-60.1	-5.6
2437.95	-81 x 50	-65.7	-60.1	-5.6
2438.00	-80 x 50	-65.7	-60.1	-5.6

Table 1.1 - J/S values for (f_{center} – 120 x 50kHz) to (f_{center} – 80 x 50kHz)

System Bandwidth = $f_{center} \pm 6MHz$ (6000kHz = 120 x 50kHz)
System Channel = 2442MHz

Frequency (MHz)	Frequency Offset (kHz)	J (dBm)	S (dBm)	J/S (dB)
2438.00	-80 x 50	-65.7	-60.1	-5.6
2438.05	-79 x 50	-65.7	-60.1	-5.6
2438.10	-78 x 50	-65.7	-60.1	-5.6
2438.15	-77 x 50	-65.6	-60.1	-5.5
2438.20	-76 x 50	-65.7	-60.1	-5.6
2438.25	-75 x 50	-65.8	-60.1	-5.7
2438.30	-74 x 50	-66.0	-60.1	-5.9
2438.35	-73 x 50	-65.8	-60.1	-5.7
2438.40	-72 x 50	-65.9	-60.1	-5.8
2438.45	-71 x 50	-65.7	-60.1	-5.6
2438.50	-70 x 50	-65.8	-60.1	-5.7
2438.55	-69 x 50	-65.8	-60.1	-5.7
2438.60	-68 x 50	-65.8	-60.1	-5.7
2438.65	-67 x 50	-65.7	-60.1	-5.6
2438.70	-66 x 50	-65.8	-60.1	-5.7
2438.75	-65 x 50	-65.7	-60.1	-5.6
2438.80	-64 x 50	-65.7	-60.1	-5.6
2438.85	-63 x 50	-65.8	-60.1	-5.7
2438.90	-62 x 50	-65.6	-60.1	-5.5
2438.95	-61 x 50	-65.8	-60.1	-5.7
2439.00	-60 x 50	-65.8	-60.1	-5.7
2439.05	-59 x 50	-65.8	-60.1	-5.7
2439.10	-58 x 50	-65.8	-60.1	-5.7
2439.15	-57 x 50	-65.7	-60.1	-5.6
2439.20	-56 x 50	-65.9	-60.1	-5.8
2439.25	-55 x 50	-65.9	-60.1	-5.8
2439.30	-54 x 50	-65.8	-60.1	-5.7
2439.35	-53 x 50	-65.8	-60.1	-5.7
2439.40	-52 x 50	-65.7	-60.1	-5.6
2439.45	-51 x 50	-65.7	-60.1	-5.6
2439.50	-50 x 50	-65.7	-60.1	-5.6
2439.55	-49 x 50	-65.7	-60.1	-5.6
2439.60	-48 x 50	-65.8	-60.1	-5.7
2439.65	-47 x 50	-65.9	-60.1	-5.8
2439.70	-46 x 50	-65.9	-60.1	-5.8
2439.75	-45 x 50	-65.9	-60.1	-5.8
2439.80	-44 x 50	-65.8	-60.1	-5.7
2439.85	-43 x 50	-65.7	-60.1	-5.6
2439.90	-42 x 50	-65.9	-60.1	-5.8
2439.95	-41 x 50	-65.9	-60.1	-5.8
2440.00	-40 x 50	-66.0	-60.1	-5.9

Table 1.2 - J/S values for (f_{center} – 80 x 50kHz) to (f_{center} – 40 x 50kHz)

System Bandwidth = $f_{center} \pm 6MHz$ (6000kHz = 120 x 50kHz)
System Channel = 2442MHz

Frequency (MHz)	Frequency Offset (kHz)	J (dBm)	S (dBm)	J/S (dB)
2440.00	-40 x 50	-66.0	-60.1	-5.9
2440.05	-39 x 50	-66.0	-60.1	-5.9
2440.10	-38 x 50	-66.0	-60.1	-5.9
2440.15	-37 x 50	-65.9	-60.1	-5.8
2440.20	-36 x 50	-66.0	-60.1	-5.9
2440.25	-35 x 50	-66.0	-60.1	-5.9
2440.30	-34 x 50	-65.8	-60.1	-5.7
2440.35	-33 x 50	-65.6	-60.1	-5.5
2440.40	-32 x 50	-65.5	-60.1	-5.4
2440.45	-31 x 50	-65.5	-60.1	-5.4
2440.50	-30 x 50	-65.5	-60.1	-5.4
2440.55	-29 x 50	-65.6	-60.1	-5.5
2440.60	-28 x 50	-65.5	-60.1	-5.4
2440.65	-27 x 50	-65.8	-60.1	-5.7
2440.70	-26 x 50	-65.7	-60.1	-5.6
2440.75	-25 x 50	-65.6	-60.1	-5.5
2440.80	-24 x 50	-65.5	-60.1	-5.4
2440.85	-23 x 50	-65.6	-60.1	-5.5
2440.90	-22 x 50	-65.7	-60.1	-5.6
2440.95	-21 x 50	-65.6	-60.1	-5.5
2441.00	-20 x 50	-65.8	-60.1	-5.7
2441.05	-19 x 50	-65.6	-60.1	-5.5
2441.10	-18 x 50	-65.6	-60.1	-5.5
2441.15	-17 x 50	-65.6	-60.1	-5.5
2441.20	-16 x 50	-65.7	-60.1	-5.6
2441.25	-15 x 50	-65.9	-60.1	-5.8
2441.30	-14 x 50	-65.6	-60.1	-5.5
2441.35	-13 x 50	-65.4	-60.1	-5.3
2441.40	-12 x 50	-65.4	-60.1	-5.3
2441.45	-11 x 50	-65.5	-60.1	-5.4
2441.50	-10 x 50	-65.5	-60.1	-5.4
2441.55	-9 x 50	-65.6	-60.1	-5.5
2441.60	-8 x 50	-65.6	-60.1	-5.5
2441.65	-7 x 50	-65.9	-60.1	-5.8
2441.70	-6 x 50	-65.9	-60.1	-5.8
2441.75	-5 x 50	-65.9	-60.1	-5.8
2441.80	-4 x 50	-65.9	-60.1	-5.8
2441.85	-3 x 50	-65.8	-60.1	-5.7
2441.90	-2 x 50	-65.8	-60.1	-5.7
2441.95	-1 x 50	-65.8	-60.1	-5.7
2442.00	0 x 50	-66.0	-60.1	-5.9

Table 1.3 - J/S values for (f_{center} – 40 x 50kHz) to (f_{center} – 0 x 50kHz)

System Bandwidth = $f_{center} \pm 6MHz$ (6000kHz = 120 x 50kHz)
System Channel = 2442MHz

Frequency (MHz)	Frequency Offset (kHz)	J (dBm)	S (dBm)	J/S (dB)
2442.00	0 x 50	-66.0	-59.6	-6.4
2442.05	+1 x 50	-65.9	-59.6	-6.3
2442.10	+2 x 50	-65.8	-59.6	-6.2
2442.15	+3 x 50	-65.8	-59.6	-6.2
2442.20	+4 x 50	-65.5	-59.6	-5.9
2442.25	+5 x 50	-65.8	-59.6	-6.2
2442.30	+6 x 50	-65.7	-59.6	-6.1
2442.35	+7 x 50	-65.6	-59.6	-6.0
2442.40	+8 x 50	-65.3	-59.6	-5.7
2442.45	+9 x 50	-65.3	-59.6	-5.7
2442.50	+10 x 50	-65.2	-59.6	-5.6
2442.55	+11 x 50	-65.1	-59.6	-5.5
2442.60	+12 x 50	-65.1	-59.6	-5.5
2442.65	+13 x 50	-65.1	-59.6	-5.5
2442.70	+14 x 50	-65.3	-59.6	-5.7
2442.75	+15 x 50	-65.2	-59.6	-5.6
2442.80	+16 x 50	-64.9	-59.6	-5.3
2442.85	+17 x 50	-65.0	-59.6	-5.4
2442.90	+18 x 50	-65.0	-59.6	-5.4
2442.95	+19 x 50	-65.0	-59.6	-5.4
2443.00	+20 x 50	-64.8	-59.6	-5.2
2443.05	+21 x 50	-64.8	-59.6	-5.2
2443.10	+22 x 50	-64.8	-59.6	-5.2
2443.15	+23 x 50	-64.8	-59.6	-5.2
2443.20	+24 x 50	-64.9	-59.6	-5.3
2443.25	+25 x 50	-64.9	-59.6	-5.3
2443.30	+26 x 50	-64.9	-59.6	-5.3
2443.35	+27 x 50	-64.8	-59.6	-5.2
2443.40	+28 x 50	-64.8	-59.6	-5.2
2443.45	+29 x 50	-64.7	-59.6	-5.1
2443.50	+30 x 50	-64.8	-59.6	-5.2
2443.55	+31 x 50	-64.8	-59.6	-5.2
2443.60	+32 x 50	-64.7	-59.6	-5.1
2443.65	+33 x 50	-64.8	-59.6	-5.2
2443.70	+34 x 50	-64.8	-59.6	-5.2
2443.75	+35 x 50	-64.8	-59.6	-5.2
2443.80	+36 x 50	-64.7	-59.6	-5.1
2443.85	+37 x 50	-64.6	-59.6	-5.0
2443.90	+38 x 50	-64.8	-59.6	-5.2
2443.95	+39 x 50	-64.8	-59.6	-5.2
2444.00	+40 x 50	-64.8	-59.0	-5.8

Table 1.4 - J/S values for (f_{center} + 0 x 50kHz) to (f_{center} + 40 x 50kHz)

System Bandwidth = $f_{center} \pm 6MHz$ (6000kHz = 120 x 50kHz)
System Channel = 2442MHz

Frequency (MHz)	Frequency Offset (kHz)	J (dBm)	S (dBm)	J/S (dB)
2444.00	+40 x 50	-64.8	-59.0	-5.8
2444.05	+41 x 50	-64.6	-59.0	-5.6
2444.10	+42 x 50	-64.7	-59.0	-5.7
2444.15	+43 x 50	-64.6	-59.0	-5.6
2444.20	+44 x 50	-64.6	-59.0	-5.6
2444.25	+45 x 50	-64.5	-59.0	-5.5
2444.30	+46 x 50	-65.4	-59.0	-6.4
2444.35	+47 x 50	-64.4	-59.0	-5.4
2444.40	+48 x 50	-64.5	-59.0	-5.5
2444.45	+49 x 50	-64.3	-59.0	-5.3
2444.50	+50 x 50	-64.4	-59.0	-5.4
2444.55	+51 x 50	-64.3	-59.0	-5.3
2444.60	+52 x 50	-64.4	-59.0	-5.4
2444.65	+53 x 50	-64.5	-59.0	-5.5
2444.70	+54 x 50	-64.6	-59.0	-5.6
2444.75	+55 x 50	-64.3	-59.0	-5.3
2444.80	+56 x 50	-64.3	-59.0	-5.3
2444.85	+57 x 50	-64.2	-59.0	-5.2
2444.90	+58 x 50	-64.2	-59.0	-5.2
2444.95	+59 x 50	-64.2	-59.0	-5.2
2445.00	+60 x 50	-65.8	-59.0	-6.8
2445.05	+61 x 50	-65.6	-59.0	-6.6
2445.10	+62 x 50	-65.6	-59.0	-6.6
2445.15	+63 x 50	-65.6	-59.0	-6.6
2445.20	+64 x 50	-65.7	-59.0	-6.7
2445.25	+65 x 50	-65.9	-59.0	-6.9
2445.30	+66 x 50	-65.6	-59.0	-6.6
2445.35	+67 x 50	-65.4	-59.0	-6.4
2445.40	+68 x 50	-65.4	-59.0	-6.4
2445.45	+69 x 50	-65.5	-59.0	-6.5
2445.50	+70 x 50	-65.5	-59.0	-6.5
2445.55	+71 x 50	-65.6	-59.0	-6.6
2445.60	+72 x 50	-65.6	-59.0	-6.6
2445.65	+73 x 50	-65.9	-59.0	-6.9
2445.70	+74 x 50	-65.9	-59.0	-6.9
2445.75	+75 x 50	-65.9	-59.0	-6.9
2445.80	+76 x 50	-65.9	-59.0	-6.9
2445.85	+77 x 50	-65.8	-59.0	-6.8
2445.90	+78 x 50	-65.8	-59.0	-6.8
2445.95	+79 x 50	-65.9	-59.0	-6.9
2446.00	+80 x 50	-63.6	-58.8	-4.8

Table 1.5 - J/S values for (f_{center} + 40 x 50kHz) to (f_{center} + 80 x 50kHz)

System Bandwidth = $f_{center} \pm 6MHz$ (6000kHz = 120 x 50kHz)
System Channel = 2442MHz

Frequency (MHz)	Frequency Offset (kHz)	J (dBm)	S (dBm)	J/S (dB)
2446.00	+80 x 50	-63.6	-58.8	-4.8
2446.05	+81 x 50	-63.6	-58.8	-4.8
2446.10	+82 x 50	-63.6	-58.8	-4.8
2446.15	+83 x 50	-63.7	-58.8	-4.9
2446.20	+84 x 50	-63.6	-58.8	-4.8
2446.25	+85 x 50	-63.6	-58.8	-4.8
2446.30	+86 x 50	-63.6	-58.8	-4.8
2446.35	+87 x 50	-63.7	-58.8	-4.9
2446.40	+88 x 50	-63.7	-58.8	-4.9
2446.45	+89 x 50	-63.7	-58.8	-4.9
2446.50	+90 x 50	-63.7	-58.8	-4.9
2446.55	+91 x 50	-63.6	-58.8	-4.8
2446.60	+92 x 50	-63.6	-58.8	-4.8
2446.65	+93 x 50	-63.6	-58.8	-4.8
2446.70	+94 x 50	-63.4	-58.8	-4.6
2446.75	+95 x 50	-63.4	-58.8	-4.6
2446.80	+96 x 50	-63.4	-58.8	-4.6
2446.85	+97 x 50	-63.3	-58.8	-4.5
2446.90	+98 x 50	-63.3	-58.8	-4.5
2446.95	+99 x 50	-63.2	-58.8	-4.4
2447.00	+100 x 50	-63.6	-58.8	-4.8
2447.05	+101 x 50	-63.2	-58.8	-4.4
2447.10	+102 x 50	-63.1	-58.8	-4.3
2447.15	+103 x 50	-63.4	-58.8	-4.6
2447.20	+104 x 50	-63.3	-58.8	-4.5
2447.25	+105 x 50	-63.5	-58.8	-4.7
2447.30	+106 x 50	-63.5	-58.8	-4.7
2447.35	+107 x 50	-63.4	-58.8	-4.6
2447.40	+108 x 50	-63.5	-58.8	-4.7
2447.45	+109 x 50	-63.5	-58.8	-4.7
2447.50	+110 x 50	-63.5	-58.8	-4.7
2447.55	+111 x 50	-63.6	-58.8	-4.8
2447.60	+112 x 50	-63.5	-58.8	-4.7
2447.65	+113 x 50	-63.5	-58.8	-4.7
2447.70	+114 x 50	-63.5	-58.8	-4.7
2447.75	+115 x 50	-63.5	-58.8	-4.7
2447.80	+116 x 50	-63.4	-58.8	-4.6
2447.85	+117 x 50	-63.6	-58.8	-4.8
2447.90	+118 x 50	-63.2	-58.8	-4.4
2447.95	+119 x 50	-63.2	-58.8	-4.4
2448.00	+120 x 50	-63.0	-58.8	-4.2

Table 1.6 - J/S values for (f_{center} + 80 x 50kHz) to (f_{center} + 120 x 50kHz)

3.2 Summary J/S values

All the measured J/S values are collected in Table 2 and sorted in ascending order. The lowest 20% of the points are then discarded. The remaining lowest J/S measurement is **–6.6dB**.

Table 1	Table 2	Table 3	Table 4	Table 5	Table 6
~~-6.9~~	-5.9	-6.4	-6.4	~~-6.9~~	-4.9
~~-6.8~~	-5.9	-5.9	-6.3	~~-6.9~~	-4.9
~~-6.7~~	-5.8	-5.9	-6.2	~~-6.9~~	-4.9
~~-6.7~~	-5.8	-5.9	-6.2	~~-6.9~~	-4.9
~~-6.7~~	-5.8	-5.9	-6.2	~~-6.9~~	-4.9
~~-6.7~~	-5.8	-5.9	-6.1	~~-6.9~~	-4.8
~~-6.7~~	-5.8	-5.8	-6.0	~~-6.8~~	-4.8
~~-6.6~~	-5.8	-5.8	-5.9	~~-6.8~~	-4.8
~~-6.6~~	-5.8	-5.8	-5.8	~~-6.8~~	-4.8
-6.5	-5.8	-5.8	-5.7	~~-6.7~~	-4.8
-6.5	-5.7	-5.8	-5.7	~~-6.6~~	-4.8
-6.5	-5.7	-5.8	-5.7	~~-6.6~~	-4.8
-6.5	-5.7	-5.7	-5.6	~~-6.6~~	-4.8
-6.4	-5.7	-5.7	-5.6	~~-6.6~~	-4.8
-6.4	-5.7	-5.7	-5.5	~~-6.6~~	-4.8
-6.4	-5.7	-5.7	-5.5	**J/S = -6.6**	-4.8
-6.4	-5.7	-5.7	-5.5	-6.5	-4.8
-6.3	-5.7	-5.7	-5.4	-6.5	-4.7
-6.3	-5.7	-5.6	-5.4	-6.4	-4.7
-6.3	-5.7	-5.6	-5.4	-6.4	-4.7
-6.3	-5.7	-5.6	-5.3	-6.4	-4.7
-6.3	-5.7	-5.5	-5.3	-5.8	-4.7
-6.2	-5.7	-5.5	-5.3	-5.7	-4.7
-6.2	-5.7	-5.5	-5.3	-5.6	-4.7
-6.2	-5.7	-5.5	-5.2	-5.6	-4.7
-6.1	-5.6	-5.5	-5.2	-5.6	-4.7
-6.1	-5.6	-5.5	-5.2	-5.6	-4.6
-6.1	-5.6	-5.5	-5.2	-5.5	-4.6
-6.1	-5.6	-5.5	-5.2	-5.5	-4.6
-6.1	-5.6	-5.5	-5.2	-5.5	-4.6
-6.0	-5.6	-5.5	-5.2	-5.4	-4.6
-5.9	-5.6	-5.5	-5.2	-5.4	-4.6
-5.8	-5.6	-5.4	-5.2	-5.4	-4.5
-5.7	-5.6	-5.4	-5.2	-5.3	-4.5
-5.6	-5.6	-5.4	-5.2	-5.3	-4.5
-5.6	-5.6	-5.4	-5.2	-5.3	-4.4
-5.6	-5.6	-5.4	-5.2	-5.3	-4.4
-5.6	-5.6	-5.4	-5.1	-5.2	-4.4
-5.6	-5.6	-5.4	-5.1	-5.2	-4.4
-5.6	-5.5	-5.3	-5.1	-5.2	-4.3
-5.6	-5.5	-5.3	-5.0	-4.8	-4.2

Table 2 - J/S Values sorted in ascending order

3.3 Measured processing gain

Summary of processing gain figures:

E_S/N_0 = 17dB (Required energy per symbol - to - noise ratio)
M_J = - 6.6dB (Jamming margin, or J/S ratio)
L_{SYS} = 2dB (System implementation loss)

These values are used to determine the processing gain:

$$G_P = 17dB + (-6.6dB) + 2dB$$
$$= 12.4dB$$

12.4dB of processing gain falls within the acceptable FCC limits required under part 15.247(e) rules.