June 22, 1998

INTERAIR WIRELESS
485 Cayuga Road. P.O. Box 222
Buffalo, New York
USA, 14225-0222

Attn.: **Mr. Dave Chauncey, Director RF Engineering**

Subject: **Certification Application under FCC Part 15, Subpart C, Para. 15.247, Direct Sequence Spread Spectrum (DSSS) Transmitters Operating in the Frequency Band 2408.625 - 2464.875 MHz.**

Product: ISP DIRECT INDOOR & OUTDOOR UNITS
Model: 2401-01 (indoor) and 2401-02 (outdoor)
FCC ID: NUX-ISP2401
Correspondance ID: 1050, 731 Confirmation No.: EA89226

Dear Mr. Chauncey,

Enclosed please find correspondance to FCC regarding to questions and additional tests requested by FCC. Please feel to contact us if you have any further questions.

Best Regards,

Tri M. Luu, P.Eng.
V.P. Engineering

June 22, 1998

Federal Communications Commission
7435 Oakland Mills Road
Columbia, MD 21046
USA

Attention: Mr. Joe Dichoso,

Subject: FCC ID: NUX-ISP2401, Correspondance ID: 1050, 731 Confirmation No.: EA89226

Dear Mr. Dichoso,

This concerns your correspondance ID: 1050 on Monday 08 June 1998:

(1) The EUT is professionally installed by InterAir and the Outdoor Unit (M/N: 24001-2) is mechanically and permanently secured to the antenna as one complete assembly; please kindly refer to the photograph for assembly details. The Indoor Unit is not able to be operated without its associated Outdoor Unit/Antenna Assembly connected to it.

(2) Enclosed please find the test data for transmitter radiated emissions with all different available antennas. Also, we would like to exclude the Huber Suhner 3x3 Patch Antenna, P/N: 65119522, Gain 16.5 dBi, in this application since the rf emissions from it at 2377 MHz did not comply with the FCC Limit @ 15.209.

(3) The system block diagrams are inside the Technical Description documents which has already been requested for confidentiality filing. You may void the request for the System Block Diagrams separately if you think it is redundant.

(4) Per page 17 of our engineering test report (note below the table of measurement data), the outdoor unit/antenna assembly is professionally installed and always mounted at a distance from 40 to 400 feet away from the indoor unit; typically the outdoor unit/antenna assembly is installed on the roof of the office-building where users are not likely possible to reach it. Therefore, the SAR or RF Safety Requirements are not necessary to be performed.

(5) According to our page 17 of the test report (above the table of measurement data), the maximum power delivered to the antenna terminal is calculated as follows:

FCC Total Peak Power at the Antenna terminal = 30 dBm – (17 dBi maximum antenna gain – 6dBi) /3 = 29.3 dBm or 851 mWatts, while the EUT's RF output is at the antenna is only 190 mWatts. In real life, the RF power deliver to the antenna can be much less than 190 mWatts since our measurement use the least cable loss and shortest cable provided by the applicant.

Please kindly advise us if we apply FCC 14.247(b)(i) rules correctly: maximum peak power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceed 6 dBi.

(6) Applicant wishes to use their measured system loss to calculate the Processing Gain (instead of the FCC-suggested 2 dB system loss). Enclosed find the re-calculated Process Gain. The hard copies of system loss measurement will be forwarded to you by courrier since it has two many pages to scanned and uploaded. Through FCC OET Electronic Filing System.

Best Regards,

Tri M. Luu, P.Eng.
V.P. Engineering

- INTERAIR PROPRIETARY -

The InterAir ISP Direct Model 2041 is used to transmit LAN traffic from one location to another. The distance between locations can be up to 25 miles. The product consists of an indoor unit (IDU), outdoor unit (ODU), coaxial cable assembly, and external brick power supply. The interface to the system is TCP/IP running over 10BaseT ethernet. These components are professionally installed by InterAir Wireless certified technicians at each user's location.

The IDU and power supply are installed indoors. The IDU contains the system processor, 10BaseT ethernet interface, and radio. The ODU is installed outdoors (typically on the roof) and contains the radio power amplifier/preamplifier and the antenna. The ODU is supplied to the installer with the antenna permanently attached to the box containing the amplifier electronics.

The IDU and ODU connect together using a single 50 ohm coaxial cable. The cable is available in eight standard lengths (from 40 to 400 feet) and is supplied to the installer as a completed assembly. This cable is used to transmit all RF, DC power, and control signals between the IDU and ODU. An InterAir Wireless Proprietary electrical interface is used to transmit these signals between the two units.

The requirement of CFAR 47 Part 15.203 are met by having the antenna permanently attached to the unit. In addition, the unit is professionally installed by certified technicians. The IDU contains and interlock which prohibits it from transmitting unless a properly functioning ODU is connected using one of the eight standard coaxial cable assemblies. The ODU also contains circuitry which assures that the transmit power limit is not exceeded. IDU and ODU fault indicators are located on the front panel of the IDU and are illuminated when the interlock is activated.

-INTERAIR PROPRIETARY-

From: Mr. David Chauncy
InterAir WireLess
485 Vayuga Road, P.O. Box 22
Buffalo, New York
USA 14225-0222

MEASUREMENT DATA

RADIATED EMISSIONS MEASUREMENTS @ 3 METERS

TEST CONFIGURATION

- *This lowest, middle and highest channels were established at its full rated output power. The emissions were investigated from the lowest frequency generated by the transmitter up to the 10th harmonic of the fundamental emissions in each case. the measured level of the carrier was recorded and compared to the level of the emissions as required in Parts 15.247(c) or 15.209(a) whichever was applicable.*
- *For measuring radiated emissions at frequencies below 1 GHz, the Spectrum Analyzer was set as 100 KHz RBW, VBW ≥ RBW, SWEEP TIME: AUTO, PEAK DETECTOR.*
- *For measuring radiated emissions at frequencies above 1 GHz, the Spectrum Analyzer was set as 1 MHz RBW, 1 MHz VBW, SWEEP TIME: AUTO for PEAK measurements and 1 MHz RBW, 10 Hz VBW, SWEEP TIME: AUTO for AVERAGE measurements.*
- *The following measurements were the worst cases when the radiating antenna was placed in both horizontal and vertical polarization.*
- *The following **AVERAGE** rf levels were obtained from either Peak or Average readings added by the duty cycle correction factor. **DUTY CYCLE FACTOR = $20LOG_{10}(0.45)$ = -6.9 dB***

- **Huber Suhner 1x10 Patch Antenna, P/N: 65247322, Gain: 16.5 dBi**

Channel #: 3, Frequency: 2408.625 MHz **Full Rated Peak Power: 190 mW** **Modulation: DQPSK, narrow, 11 chips/symbol,** **Data Rate: 4.5 Mb/s, 2 bits/symbol**				**Power Level in 1 MHz BW: 126.3 dBuV/m** **Limit = 106.3 dBuV/m**			
FREQUENCY (MHz)	**RF PEAK LEVEL (dBuV/m)**	**RF AVG LEVEL (dBuV/m)**	**ANTENNA PLANE (H/V)**	**LIMIT 15.209 (dBuV/m)**	**LIMIT 15.247 (dBuV/m)**	**MARGIN (dB)**	**PASS/ FAIL**
1493.00	61.4	48.1	V	54.0	106.3	-5.9	PASS
1493.00	60.1	49.4	H	54.0	106.3	-4.6	PASS
2373.00	72.1	51.3	H	54.0	106.3	-2.7	PASS
2390.00	65.2	47.4	H	54.0	106.3	-6.6	PASS
2408.63	114.6	--	V	--	--	--	--
2408.63	126.3	--	H	--	--	--	--
4816.00	50.7	29.3	V	54.0	106.3	-24.7	PASS
4816.00	49.3	28.3	H	54.0	106.3	-25.7	PASS
No other significant emissions were found in the frequency range from 10 MHz to 25 GHz. Refer to attached plots for details							

** FCC Limit @ 15.209 was applied for frequency fell within restricted band @ 15.205*

- **Huber Suhner 1x10 Patch Antenna, P/N: 65247322, Gain: 16.5 dBi**

Channel #: 4, Frequency: 2411.4375 MHz **Full Rated Peak Power: 190 mW** **Modulation: DQPSK, medium , 11 chips/symbol,** **Data Rate: 5.625 Mb/s, 2 bits/symbol**				**Power Level in 1 MHz BW: 125.3 dBuV/m** **Limit = 105.3 dBuV/m**			
FREQUENCY (MHz)	**RF PEAK LEVEL (dBuV/m)**	**RF AVG LEVEL (dBuV/m)**	**ANTENNA PLANE (H/V)**	**LIMIT 15.209 (dBuV/m)**	**LIMIT 15.247 (dBuV/m)**	**MARGIN (dB)**	**PASS/ FAIL**
1496.00	61.3	47.2	V	54.0	105.3	-6.8	PASS
1496.00	62.0	49.0	H	54.0	105.3	-5.0	PASS
2376.00	72.7	52.4	H	54.0	105.3	-1.6	PASS
2390.00	64.9	43.0	H	54.0	105.3	-11.0	PASS
2411.44	109.3	--	V	--	--	--	--
2411.44	125.3	--	H	--	--	--	--
4488.00	48.3	30.1	V	54.0	105.3	-75.2	PASS
4488.00	47.4	31.4	H	54.0	105.3	-73.9	PASS
4822.00	52.3	34.3	V	54.0	105.3	-19.7	PASS
4822.00	51.2	31.8	H	54.0	105.3	-22.2	PASS
No other significant emissions were found in the frequency range from 10 MHz to 25 GHz. Refer to attached plots for details							

** FCC Limit @ 15.209 was applied for frequency fell within restricted band @ 15.205*

- **Huber Suhner 1x10 Patch Antenna, P/N: 65247322, Gain: 16.5 dBi**

Channel #: 6, Frequency: 2419.875 MHz **Full Rated Peak Power: 190 mW** **Modulation: DQPSK, wide, 11 chips/symbol,** **Data Rate: 11.25 Mb/s, 2 bits/symbol**				**Power Level in 1 MHz BW: 123.9 dBuV/m** **Limit = 103.9 dBuV/m**			
FREQUENCY (MHz)	**RF PEAK LEVEL (dBuV/m)**	**RF AVG LEVEL (dBuV/m)**	**ANTENNA PLANE (H/V)**	**LIMIT 15.209 (dBuV/m)**	**LIMIT 15.247 (dBuV/m)**	**MARGIN (dB)**	**PASS/ FAIL**
1504.00	60.1	47.0	V	54.0	103.9	-7.0	PASS
1504.00	62.8	49.8	H	54.0	103.9	-4.2	PASS
2379.30	67.1	43.9	H	54.0	103.9	-10.1	PASS
2385.30	73.1	50.3	H	54.0	103.9	-3.7	PASS
2390.00	73.2	46.1	H	54.0	103.9	-7.9	PASS
2419.88	108.6	--	V	--	--	--	--
2419.88	123.9	--	H	--	--	--	--
4512.00	48.2	29.4	V	54.0	103.9	-24.6	PASS
4512.00	47.6	30.0	H	54.0	103.9	-24.0	PASS
4838.00	55.0	33.9	V	54.0	103.9	-20.1	PASS
4838.00	50.3	30.4	H	54.0	103.9	-23.6	PASS
No other significant emissions were found in the frequency range from 10 MHz to 25 GHz. Refer to attached plots for details							

** FCC Limit @ 15.209 was applied for frequency fell within restricted band @ 15.205*

- **Huber Suhner 1x10 Patch Antenna, P/N: 65247322, Gain: 16.5 dBi**

Channel #: 18, Frequency: 2464.875 MHz **Full Rated Peak Power: 190 mW** **Modulation: DQPSK, narrow, 11 chips/symbol,** **Data Rate: 4.5 Mb/s, 2 bits/symbol**				**Power Level in 1 MHz BW: 125.5 dBuV/m** **Limit = 105.5 dBuV/m**			
FREQUENCY (MHz)	**RF PEAK LEVEL (dBuV/m)**	**RF AVG LEVEL (dBuV/m)**	**ANTENNA PLANE (H/V)**	**LIMIT 15.209 (dBuV/m)**	**LIMIT 15.247 (dBuV/m)**	**MARGIN (dB)**	**PASS/ FAIL**
1549.00	61.3	46.9	V	54.0	105.5	-7.1	PASS
1549.00	60.7	47.0	H	54.0	105.5	-7.0	PASS
2383.50	67.3	42.6	H	54.0	105.5	-11.4	PASS
2464.88	111.3	--	V	--	--	--	--
2464.88	125.5	--	H	--	--	--	--
4647.00	50.2	34.6	V	54.0	105.5	-19.4	PASS
4647.00	48.3	31.0	H	54.0	105.5	-23.0	PASS
4928.00	50.4	31.0	V	54.0	105.5	-23.0	PASS
4928.00	50.4	31.5	H	54.0	105.5	-22.5	PASS
No other significant emissions were found in the frequency range from 10 MHz to 25 GHz. Refer to attached plots for details							

** FCC Limit @ 15.209 was applied for frequency fell within restricted band @ 15.205*

- **Huber Suhner 1x1 Patch Antenna, P/N:64958022, Gain: 8.5 dBi**

Channel #: 3, Frequency: 2408.625 MHz **Full Rated Peak Power: 190 mW** **Modulation: DQPSK, narrow, 11 chips/symbol,** **Data Rate: 4.5 Mb/s, 2 bits/symbol**				**Power Level in 1 MHz BW: 119.5 dBuV/m** **Limit = 99.5 dBuV/m**			
FREQUENCY (MHz)	**RF PEAK LEVEL (dBuV/m)**	**RF AVG LEVEL (dBuV/m)**	**ANTENNA PLANE (H/V)**	**LIMIT 15.209 (dBuV/m)**	**LIMIT 15.247 (dBuV/m)**	**MARGIN (dB)**	**PASS/ FAIL**
1493.00	62.7	50.4	V	54.0	99.5	-3.6	PASS
1493.00	59.7	46.9	H	54.0	99.5	-7.1	PASS
2408.63	113.8	--	V	--	--	--	--
2408.63	119.5	--	H	--	--	--	--
4816.00	51.4	35.0	V	54.0	99.5	-19.0	PASS
4816.00	50.5	33.4	H	54.0	99.5	-20.6	PASS
No other significant emissions were found in the frequency range from 10 MHz to 25 GHz. Refer to attached plots for details							

** FCC Limit @ 15.209 was applied for frequency fell within restricted band @ 15.205*

- **Huber Suhner 1x1 Patch Antenna, P/N:64958022, Gain: 8.5 dBi**

Channel #: 4, Frequency: 2411.4375 MHz **Full Rated Peak Power: 190 mW** **Modulation: DQPSK, medium , 11 chips/symbol,** **Data Rate: 5.625 Mb/s, 2 bits/symbol**				**Power Level in 1 MHz BW: dBuV/m** **Limit = dBuV/m**			
FREQUENCY (MHz)	**RF PEAK LEVEL (dBuV/m)**	**RF AVG LEVEL (dBuV/m)**	**ANTENNA PLANE (H/V)**	**LIMIT 15.209 (dBuV/m)**	**LIMIT 15.247 (dBuV/m)**	**MARGIN (dB)**	**PASS/ FAIL**
1496.00	59.3	42.7	V	54.0	105.2	-11.3	PASS
1496.00	59.5	42.7	H	54.0	105.2	-11.3	PASS
2376.70	63.8	40.6	H	54.0	105.2	-13.4	PASS
2390.00	62.8	40.9	H	54.0	105.2	-13.1	PASS
2411.44	115.5	--	V	--	--	--	--
2411.44	125.2	--	H	--	--	--	--
4488.00	48.2	34.0	V	54.0	105.2	-71.2	PASS
4488.00	48.3	32.6	H	54.0	105.2	-72.6	PASS
4822.00	49.3	34.5	V	54.0	105.2	-19.5	PASS
4822.00	50.8	35.4	H	54.0	105.2	-18.7	PASS
No other significant emissions were found in the frequency range from 10 MHz to 25 GHz. Refer to attached plots for details							

** FCC Limit @ 15.209 was applied for frequency fell within restricted band @ 15.205*

- **Huber Suhner 1x1 Patch Antenna, P/N:64958022, Gain: 8.5 dBi**

Channel #: 6, Frequency: 2419.875 MHz **Full Rated Peak Power: 190 mW** **Modulation: DQPSK, wide, 11 chips/symbol,** **Data Rate: 11.25 Mb/s, 2 bits/symbol**				**Power Level in 1 MHz BW: 123.3 dBuV/m** **Limit = 103.3 dBuV/m**			
FREQUENCY (MHz)	**RF PEAK LEVEL (dBuV/m)**	**RF AVG LEVEL (dBuV/m)**	**ANTENNA PLANE (H/V)**	**LIMIT 15.209 (dBuV/m)**	**LIMIT 15.247 (dBuV/m)**	**MARGIN (dB)**	**PASS/ FAIL**
1504.00	61.3	47.3	V	54.0	103.3	-6.7	PASS
1504.00	61.8	48.8	H	54.0	103.3	-5.2	PASS
2385.00	60.4	46.1	V	54.0	103.3	-7.9	PASS
2385.00	73.9	58.6	H	54.0	103.3	4.6	PASS
2390.00	69.1	44.6	H	54.0	103.3	-9.4	PASS
2419.88	112.8	--	V	--	--	--	--
2419.88	123.3	--	H	--	--	--	--
4838.00	50.6	30.4	V	54.0	103.3	-23.6	PASS
4838.00	53.3	36.9	H	54.0	103.3	-17.2	PASS
No other significant emissions were found in the frequency range from 10 MHz to 25 GHz. Refer to attached plots for details							

** FCC Limit @ 15.209 was applied for frequency fell within restricted band @ 15.205*

- **Huber Suhner 1x1 Patch Antenna, P/N:64958022, Gain: 8.5 dBi**

Channel #: 18, Frequency: 2464.875 MHz **Full Rated Peak Power: 190 mW** **Modulation: DQPSK, narrow, 11 chips/symbol,** **Data Rate: 4.5 Mb/s, 2 bits/symbol**				**Power Level in 1 MHz BW: 125.4 dBuV/m** **Limit = 105.4 dBuV/m**			
FREQUENCY (MHz)	**RF PEAK LEVEL (dBuV/m)**	**RF AVG LEVEL (dBuV/m)**	**ANTENNA PLANE (H/V)**	**LIMIT 15.209 (dBuV/m)**	**LIMIT 15.247 (dBuV/m)**	**MARGIN (dB)**	**PASS/ FAIL**
2464.88	114.1	--	V	--	--	--	--
2464.88	125.4	--	H	--	--	--	--
2383.50	71.5	43.9	H	54.0	98.5	-54.6	PASS
No other significant emissions were found in the frequency range from 10 MHz to 25 GHz. Refer to attached plots for details							

** FCC Limit @ 15.209 was applied for frequency fell within restricted band @ 15.205*

- **Andrew Omni Antenna , P/N: RT1N0F-024V-013A, Gain: 13 dBi**

Channel #: 3, Frequency: 2408.625 MHz **Full Rated Peak Power: 190 mW** **Modulation: DQPSK, narrow, 11 chips/symbol,** **Data Rate: 4.5 Mb/s, 2 bits/symbol**				**Power Level in 1 MHz BW: 125.3 dBuV/m** **Limit = 105.3 dBuV/m**			
FREQUENCY (MHz)	**RF PEAK LEVEL (dBuV/m)**	**RF AVG LEVEL (dBuV/m)**	**ANTENNA PLANE (H/V)**	**LIMIT 15.209 (dBuV/m)**	**LIMIT 15.247 (dBuV/m)**	**MARGIN (dB)**	**PASS/ FAIL**
1493.00	62.0	44.4	V	54.0	105.3	-9.7	PASS
1493.00	59.6	45.4	H	54.0	105.3	-8.7	PASS
2374.10	66.4	47.3	V	54.0	105.3	-6.7	PASS
2384.00	60.1	42.7	V	54.0	105.3	-11.3	PASS
2390.00	69.4	45.7	V	54.0	105.3	-8.3	PASS
2408.63	125.3	--	V	--	--	--	--
2408.63	115.1	--	H	--	--	--	--
4816.00	52.3	32.6	V	54.0	105.3	-21.4	PASS
4816.00	51.5	32.7	H	54.0	105.3	-21.3	PASS
No other significant emissions were found in the frequency range from 10 MHz to 25 GHz. Refer to attached plots for details							

** FCC Limit @ 15.209 was applied for frequency fell within restricted band @ 15.205*

- **Andrew Omni Antenna , P/N: RT1N0F-024V-013A, Gain: 13 dBi**

Channel #: 4, Frequency: 2411.4375 MHz **Full Rated Peak Power: 190 mW** **Modulation: DQPSK, medium , 11 chips/symbol,** **Data Rate: 5.625 Mb/s, 2 bits/symbol**				**Power Level in 1 MHz BW: 124.6 dBuV/m** **Limit = 104.6 dBuV/m**			
FREQUENCY (MHz)	**RF PEAK LEVEL (dBuV/m)**	**RF AVG LEVEL (dBuV/m)**	**ANTENNA PLANE (H/V)**	**LIMIT 15.209 (dBuV/m)**	**LIMIT 15.247 (dBuV/m)**	**MARGIN (dB)**	**PASS/ FAIL**
1496.00	64.4	50.7	V	54.0	104.6	-3.3	PASS
1496.00	60.3	46.8	H	54.0	104.6	-7.2	PASS
2377.00	69.8	51.1	V	54.0	104.6	-2.9	PASS
2390.00	63.7	43.6	V	54.0	104.6	-10.4	PASS
2411.44	124.6	117.7	V	54.0	104.6	63.7	PASS
2411.44	112.0	105.1	H	54.0	104.6	51.1	PASS
4488.00	50.2	31.9	V	54.0	104.6	-72.8	PASS
4488.00	48.5	30.9	H	54.0	104.6	-73.7	PASS
4822.00	57.9	38.8	V	54.0	104.6	-15.2	PASS
4822.00	57.7	37.8	H	54.0	104.6	-16.2	PASS
No other significant emissions were found in the frequency range from 10 MHz to 25 GHz. Refer to attached plots for details							

** FCC Limit @ 15.209 was applied for frequency fell within restricted band @ 15.205*

- **Andrew Omni Antenna , P/N: RT1N0F-024V-013A, Gain: 13 dBi**

Channel #: 6, Frequency: 2419.875 MHz **Full Rated Peak Power: 190 mW** **Modulation: DQPSK, wide, 11 chips/symbol,** **Data Rate: 11.25 Mb/s, 2 bits/symbol**				**Power Level in 1 MHz BW: 120.6 dBuV/m** **Limit = 100.6 dBuV/m**			
FREQUENCY (MHz)	**RF PEAK LEVEL (dBuV/m)**	**RF AVG LEVEL (dBuV/m)**	**ANTENNA PLANE (H/V)**	**LIMIT 15.209 (dBuV/m)**	**LIMIT 15.247 (dBuV/m)**	**MARGIN (dB)**	**PASS/ FAIL**
1504.00	63.0	46.6	V	54.0	100.6	-7.4	PASS
1504.00	60.0	42.5	H	54.0	100.6	-11.5	PASS
2385.00	67.6	46.5	V	54.0	100.6	-7.5	PASS
2419.88	120.6	--	V	--	--	--	--
2419.88	107.3	--	H	--	--	--	--
4838.00	54.1	33.7	V	54.0	100.6	-20.3	PASS
4838.00	50.0	30.3	H	54.0	100.6	-23.7	PASS
No other significant emissions were found in the frequency range from 10 MHz to 25 GHz. Refer to attached plots for details							

** FCC Limit @ 15.209 was applied for frequency fell within restricted band @ 15.205*

- **Andrew Omni Antenna , P/N: RT1N0F-024V-013A, Gain: 13 dBi**

Channel #: 18, Frequency: 2464.875 MHz **Full Rated Peak Power: 190 mW** **Modulation: DQPSK, narrow, 11 chips/symbol,** **Data Rate: 4.5 Mb/s, 2 bits/symbol**				**Power Level in 1 MHz BW: 119.6 dBuV/m** **Limit = 99.6 dBuV/m**			
FREQUENCY (MHz)	**RF PEAK LEVEL (dBuV/m)**	**RF AVG LEVEL (dBuV/m)**	**ANTENNA PLANE (H/V)**	**LIMIT 15.209 (dBuV/m)**	**LIMIT 15.247 (dBuV/m)**	**MARGIN (dB)**	**PASS/ FAIL**
1549.00	61.1	45.4	V	54.0	99.6	-8.6	PASS
1549.00	59.8	46.9	H	54.0	99.6	-7.1	PASS
2464.88	119.6	--	V	--	--	--	--
2464.88	111.4	--	H	--	--	--	--
4647.00	50.2	35.0	V	54.0	99.6	-19.0	PASS
4647.00	48.8	33.8	H	54.0	99.6	-20.2	PASS
4928.00	53.5	38.2	V	54.0	99.6	-15.8	PASS
4928.00	53.3	34.8	H	54.0	99.6	-19.2	PASS
No other significant emissions were found in the frequency range from 10 MHz to 25 GHz. Refer to attached plots for details							

** FCC Limit @ 15.209 was applied for frequency fell within restricted band @ 15.205*

- **Processing Gain of A Direct Sequence Spread Spectrum, FCC CFR 47, Para. 15.247(e)**

PRODUCT NAME: **ISP DIRECT INDOOR & OUTDOOR UNITS, Model No.: 2401-01 (indoor) and 2401-02 (outdoor)**

FCC REQUIREMENTS:

The processing gain of a direct sequence system shall be at least 10 dB. The processing gain shall be determined from the ratio in dB of the signal-to-noise ratio with the system spreading code turned off to the signal-to-noise ratio with the system spreading code turned on, as measured at the demodulated output of the receiver.

CLIMATE CONDITION:

Standard Temperature and Humidity:

- Ambient temperature: 23 ^{o}C
- Relative humidity: 43 %

POWER INPUT:

AC 120 V 60Hz from Elpac external switching power supply, model WRI4232.

TEST EQUIPMENT:

- Advantest Spectrum Analyzer, Model R3271, S/N: 15050203
- Bird 20 dB Attenuator, 50 Ohm IN/OUT
- IBM PS/1 & IBM 350 ThinkPad Host Computer(s)
- Fluke RF Signal Generator, Model 6061A, Freq. range: 10 KHz - 1050 MHz.
- HP 8900 RF Peak Power Meter, Measuring Frequency Range: 100 MHz - 18 GHz.

METHOD OF MEASUREMENT:

METHOD #1:- Jamming Margin Method

The processing gain may be measured using the CW jamming margin method. Figure 1 shows the test configuration. The test consists of stepping a signal generator in 50 KHz increments across the passband of the system. At each point, the generator level required to produce the recommended Bit Error Rate (BER) is recorded. This level is jammer level. The output power of the transmitting unit is measured at the same point. The Jammer to Signal (J/S) ratio is then calculated. Discard the worst 20% of the J/S data points. The lowest remaining J/S ratio is used when calculating the Process Gain.

The signal to noise ratio for an ideal non-coherent receiver is calculated from:

(1) $$Pe = 1/2e^{(-1/2(S/N)o)}$$

where: Pe = probability of error (BER)
(S/N)o = the required signal to noise ratio at the receiver output for a given received signal quality

Ref.: Viterbi, A.J. Principles of Coherent Communications (New York: McGraw-HILL 1966), Pg. 207

Using equation (1) shown above, calculate the signal to noise ratio required for your chosen BER. This value and the measured J/S ratio are used in the following equation to calculate the Process Gain (Gp) of the system.

Gp = (S/N)o+Mj+Lsys

Where:

(S/N)o: Theoretical signal to noise ratio required to maintain the normal operation just before the BERappears. In real measurements the maximum error of 0.001 is allowed in an ideal system using their modulation scheme with all codes turned off (i.e. no spreading or processing gain).

Mj: Maximum jammer to Signal Ratio that recorded at the detected BER.

Lsys: System losses such as non-ideal synchronization, tracking circuitry, non-optimal baseband receiver filtering and etc... These losses can be in excess of 2 dB for each transmitter and receiver pair. For the purpose of this processing gain calculation we assume a Lsys at its minimum value of 2 dB.

Ref.: Dixon, R, Spread Spectrum Systems. (New York: Wiley, 1984)

The Signal-to-Noise Ratio (S/N) with respect to the probability of bit error for a differentially QPSK (DQPSK) receiver in the presence of additive white Gaussian noise (AWGN) is given by Figure 4.5.1 as attached.

Ref.: Marvin Simon, Spread Spectrum Communication Handbook, page 695.

Since the CW jamming is a tone jamming, the (S/N)o for a AWGN jamming obtained from Figure 4.5.1 can be converted to the CW jamming or tone jamming using the formula (3.97) of the Marvin Simon Spread Spectrum Communication Handbook as follows:

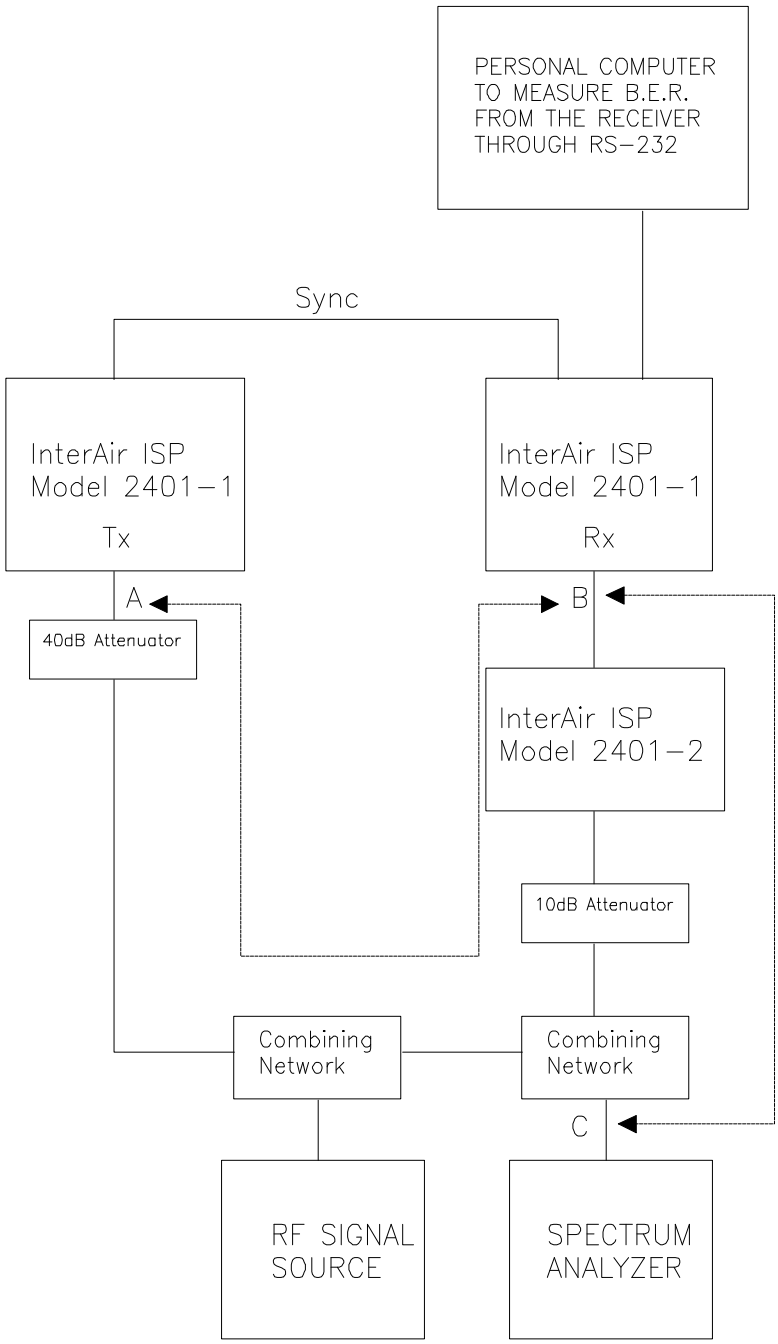
$(S/N)_o^t$ in dB = $(S/N)_o^{AWGN}$ / 0.8

TEST RESULTS: Conforms.

TEST PERSONNEL: Mr. Tri M. Luu, P.Eng.

DATE: Mar. 31 & Apr. 01, 1998

Figure 1:- SETUP FOR PROCESSING GAIN MEASUREMENT - JAMMING MARGIN METHOD



MEASUREMENT DATA:

Channel #4, Fc = 2411.4375 MHz	**Data Rate = 1.023 Mbps (DQPSK), Medium**
Chip Rate = 5.625 MHz	**PN Code Length = 11 chips/symbol**
6 dB BW = 5 MHz	

(S/N)o = 12 dB dB per attached Figure 4.5.1
Measured Processing Gain Gp = (S/N)o + Lsys + Mj = 15 + 2 + Mj = 17 + Mj (dB)
Theoretical Calculated Processing Gain = Chip Rate/Data rate = 5.625 MHz = 11.0 or 10.4 dB

(1.023 Mb/s)/(2 bits/symbol)

Note:
- Total Peak Power from the EUT's Tx measured at the EUT's Rx Input: P_t = -46.7 dBm
- Jamming signal level at measured at the EUT's receiver input: J
- Mj = J-P_t
- The following shaded boxes are discarded worst measurements (19.1% of total measurement points)

SUMMARY OF TEST RESULTS	
Theoretical Process Gain	**10.4 dB**
Minimum Measured Process Gain with discard of 19.1% of the worst measurements	**12.0 dB**

Test Point	Jammer Signal Freq. +/- Fc (MHz)	(BER) (DQPSK)	(S/N)o (dB)	System Loss Lsys (dB)	Jammer to Signal Ratio Mj (dB)	Measured Processing Gain (dB)	Discarded Readings
1	-3.5	0.00001	12	4.5	1.7	18.2	
2	-3.5	0.00001	12	4.5	2.0	18.5	
3	-3.4	0.00001	12	4.5	1.6	18.1	
4	-3.4	0.00001	12	4.5	1.7	18.2	
5	-3.3	0.00001	12	4.5	0.6	17.1	
6	-3.3	0.00001	12	4.5	-0.4	16.1	
7	-3.2	0.00001	12	4.5	-0.4	16.1	
8	-3.2	0.00001	12	4.5	-0.4	16.1	
9	-3.1	0.00001	12	4.5	0.0	16.5	
10	-3.1	0.00001	12	4.5	0.8	17.3	
11	-3.0	0.00001	12	4.5	0.8	17.3	
12	-3.0	0.00001	12	4.5	1.6	18.1	
13	-2.9	0.00001	12	4.5	1.6	18.1	
14	-2.9	0.00001	12	4.5	1.7	18.2	
15	-2.8	0.00001	12	4.5	1.5	18.0	
16	-2.8	0.00001	12	4.5	1.1	17.6	
17	-2.7	0.00001	12	4.5	0.8	17.3	
18	-2.7	0.00001	12	4.5	0.7	17.2	
19	-2.6	0.00001	12	4.5	-0.4	16.1	
20	-2.6	0.00001	12	4.5	-2.4	14.1	
21	-2.5	0.00001	12	4.5	-2.7	13.8	
22	-2.5	0.00001	12	4.5	-2.8	13.7	
23	-2.4	0.00001	12	4.5	-2.9	13.6	
24	-2.4	0.00001	12	4.5	-2.9	13.6	
25	-2.3	0.00001	12	4.5	-2.6	13.9	
26	-2.3	0.00001	12	4.5	-2.6	13.9	

27	-2.2	0.00001	12	4.5	-2.5	14.0	
28	-2.2	0.00001	12	4.5	-2.9	13.6	
29	-2.1	0.00001	12	4.5	-3.6	12.9	
30	-2.1	0.00001	12	4.5	-4.4	12.1	
31	**-2.0**	**0.00001**	**12**	**4.5**	**-4.5**	**12.0**	
32	-2.0	0.00001	12	4.5	-4.6	11.9	20
33	**-1.9**	**0.00001**	**12**	**4.5**	**-4.5**	**12.0**	
34	-1.9	0.00001	12	4.5	-4.8	11.7	13
35	-1.8	0.00001	12	4.5	-4.4	12.1	
36	-1.8	0.00001	12	4.5	-3.8	12.7	
37	-1.7	0.00001	12	4.5	-3.2	13.3	
38	-1.7	0.00001	12	4.5	-3.1	13.4	
39	-1.6	0.00001	12	4.5	-3.3	13.2	
40	-1.6	0.00001	12	4.5	-4.0	12.5	
41	-1.5	0.00001	12	4.5	-6.3	10.2	1
42	-1.5	0.00001	12	4.5	-5.4	11.1	3
43	-1.4	0.00001	12	4.5	-5.8	10.7	2
44	-1.4	0.00001	12	4.5	-5.0	11.5	7
45	-1.3	0.00001	12	4.5	-4.8	11.7	14
46	-1.3	0.00001	12	4.5	-4.3	12.2	
47	-1.2	0.00001	12	4.5	-3.9	12.6	
48	-1.2	0.00001	12	4.5	-3.8	12.7	
49	-1.1	0.00001	12	4.5	-3.3	13.2	
50	-1.1	0.00001	12	4.5	-3.8	12.7	
51	-1.0	0.00001	12	4.5	-3.8	12.7	
52	-1.0	0.00001	12	4.5	-4.6	11.9	21
53	-0.9	0.00001	12	4.5	-4.9	11.6	12
54	-0.9	0.00001	12	4.5	-5.1	11.4	6
55	-0.8	0.00001	12	4.5	-5.3	11.2	4
56	-0.8	0.00001	12	4.5	-5.3	11.2	5
57	-0.7	0.00001	12	4.5	-4.8	11.7	15
58	-0.7	0.00001	12	4.5	-4.0	12.5	
59	-0.6	0.00001	12	4.5	-3.3	13.2	
60	-0.6	0.00001	12	4.5	-2.7	13.8	
61	-0.5	0.00001	12	4.5	-3.8	12.7	
62	-0.5	0.00001	12	4.5	-4.2	12.3	
63	-0.4	0.00001	12	4.5	-4.1	12.4	
64	-0.4	0.00001	12	4.5	-4.0	12.5	
65	-0.3	0.00001	12	4.5	-4.8	11.7	16
66	-0.3	0.00001	12	4.5	-3.3	13.2	
67	-0.2	0.00001	12	4.5	-3.8	12.7	
68	-0.2	0.00001	12	4.5	-3.6	12.9	
69	-0.1	0.00001	12	4.5	-2.7	13.8	
70	-0.1	0.00001	12	4.5	-3.0	13.5	
71	0.0	0.00001	12	4.5	-3.3	13.2	
72	0.1	0.00001	12	4.5	-5.0	11.5	8
73	0.1	0.00001	12	4.5	-4.6	11.9	22
74	0.2	0.00001	12	4.5	-4.6	11.9	23
75	**0.2**	**0.00001**	**12**	**4.5**	**-4.5**	**12.0**	
76	0.3	0.00001	12	4.5	-4.7	11.8	17

77	**0.3**	**0.00001**	**12**	**4.5**	**-4.5**	**12.0**	
78	0.4	0.00001	12	4.5	-5.0	11.5	9
79	0.4	0.00001	12	4.5	-5.0	11.5	10
80	0.5	0.00001	12	4.5	-4.6	11.9	24
81	0.5	0.00001	12	4.5	-4.6	11.9	25
82	0.6	0.00001	12	4.5	-4.2	12.3	
83	0.6	0.00001	12	4.5	-5.0	11.5	11
84	0.7	0.00001	12	4.5	-4.6	11.9	26
85	0.7	0.00001	12	4.5	-4.2	12.3	
86	0.8	0.00001	12	4.5	-4.4	12.1	
87	0.8	0.00001	12	4.5	-4.3	12.2	
88	0.9	0.00001	12	4.5	-4.2	12.3	
89	**0.9**	**0.00001**	**12**	**4.5**	**-4.5**	**12.0**	
90	**1.0**	**0.00001**	**12**	**4.5**	**-4.5**	**12.0**	
91	1.0	0.00001	12	4.5	-4.1	12.4	
92	1.1	0.00001	12	4.5	-3.7	12.8	
93	1.1	0.00001	12	4.5	-3.9	12.6	
94	1.2	0.00001	12	4.5	-4.0	12.5	
95	1.2	0.00001	12	4.5	-3.8	12.7	
96	1.3	0.00001	12	4.5	-4.1	12.4	
97	1.3	0.00001	12	4.5	-4.4	12.1	
98	1.4	0.00001	12	4.5	-4.7	11.8	18
99	1.4	0.00001	12	4.5	-4.2	12.3	
100	1.5	0.00001	12	4.5	-4.7	11.8	19
101	1.5	0.00001	12	4.5	-4.6	11.9	27
102	1.6	0.00001	12	4.5	-2.5	14.0	
103	1.6	0.00001	12	4.5	-2.2	14.3	
104	1.7	0.00001	12	4.5	-2.2	14.3	
105	1.7	0.00001	12	4.5	-3.8	12.7	
106	1.8	0.00001	12	4.5	-2.6	13.9	
107	1.8	0.00001	12	4.5	-2.8	13.7	
108	1.9	0.00001	12	4.5	-2.8	13.7	
109	1.9	0.00001	12	4.5	-2.4	14.1	
110	2.0	0.00001	12	4.5	-2.4	14.1	
111	2.0	0.00001	12	4.5	-2.2	14.3	
112	2.1	0.00001	12	4.5	-1.9	14.6	
113	2.1	0.00001	12	4.5	-2.7	13.8	
114	2.2	0.00001	12	4.5	-2.2	14.3	
115	2.2	0.00001	12	4.5	-2.0	14.5	
116	2.3	0.00001	12	4.5	-1.8	14.7	
117	2.3	0.00001	12	4.5	-2.2	14.3	
118	2.4	0.00001	12	4.5	-2.2	14.3	
119	2.4	0.00001	12	4.5	-2.4	14.1	
120	2.5	0.00001	12	4.5	-2.4	14.1	
121	2.5	0.00001	12	4.5	-2.4	14.1	
122	2.6	0.00001	12	4.5	-2.3	14.2	
123	2.6	0.00001	12	4.5	-2.2	14.3	
124	2.7	0.00001	12	4.5	-1.9	14.6	
125	2.7	0.00001	12	4.5	0.9	17.4	
126	2.8	0.00001	12	4.5	1.2	17.7	

127	2.8	0.00001	12	4.5	1.0	17.5	
128	2.9	0.00001	12	4.5	1.2	17.7	
129	2.9	0.00001	12	4.5	1.0	17.5	
130	3.0	0.00001	12	4.5	1.2	17.7	
131	3.0	0.00001	12	4.5	0.8	17.3	
132	3.1	0.00001	12	4.5	0.0	16.5	
133	3.1	0.00001	12	4.5	-0.7	15.8	
134	3.2	0.00001	12	4.5	-1.4	15.1	
135	3.2	0.00001	12	4.5	-1.6	14.9	
136	3.3	0.00001	12	4.5	-1.6	14.9	
137	3.3	0.00001	12	4.5	-0.5	16.0	
138	3.4	0.00001	12	4.5	0.0	16.5	
139	3.4	0.00001	12	4.5	0.4	16.9	
140	3.5	0.00001	12	4.5	0.7	17.2	
141	3.5	0.00001	12	4.5	-0.1	16.4	

Channel #6, Fc = 2419.8750 MHz	Data Rate = 2.045 Mbps (DQPSK), Wide
Chip Rate = 11.25 MHz	PN Code Length = 11 chips/symbol
6 dB BW = 8.4 MHz	

(S/N)o = 12 dB per attached Figure 4.5.1

Measured Processing Gain Gp = (S/N)o + Lsys + Mj = 15 + 2 + Mj = 17 + Mj (dB)

Theoretical Calculated Processing Gain = Chip Rate/Data rate = 11.25 MHz = 11.0 or 10.4 dB

(2.045 Mb/s)/(2 bits/symbol)

Note:

- Total Peak Power from the EUT's Tx measured at the EUT's Rx Input: P_t = -46.7 dBm
- Jamming signal level at measured at the EUT's receiver input: J
- Mj = J-P_t
- The following shaded boxes are discarded worst measurements (17.9% of total measurement points)

SUMMARY OF TEST RESULTS	
Theoretical Process Gain	**10.4 dB**
Minimum Measured Process Gain with discard of 17.9% of the worst measurements	**10.5 dB**

Test Point	Jammer Signal Freq. +/- Fc (MHz)	(BER) (DQPSK)	(S/N)o (dB)	System Loss Lsys (dB)	Jammer to Signal Ratio Mj (dB)	Measured Processing Gain (dB)	Discarded Readings
1	-5.0	0.00001	12	4.5	-3.7	12.8	
2	-5.0	0.00001	12	4.5	-4.2	12.3	
3	-4.9	0.00001	12	4.5	-4.2	12.3	
4	-4.9	0.00001	12	4.5	-4.6	11.9	
5	-4.8	0.00001	12	4.5	-4.6	11.9	
6	-4.8	0.00001	12	4.5	-4.1	12.4	
7	-4.7	0.00001	12	4.5	-3.6	12.9	
8	-4.7	0.00001	12	4.5	-3.6	12.9	
9	-4.6	0.00001	12	4.5	-3.6	12.9	
10	-4.6	0.00001	12	4.5	-3.5	13.0	
11	-4.5	0.00001	12	4.5	-3.5	13.0	
12	-4.5	0.00001	12	4.5	-3.4	13.1	
13	-4.4	0.00001	12	4.5	-3.5	13.0	
14	-4.4	0.00001	12	4.5	-3.6	12.9	
15	-4.3	0.00001	12	4.5	-4.3	12.2	
16	-4.3	0.00001	12	4.5	-4.9	11.6	
17	-4.2	0.00001	12	4.5	-5.6	10.9	
18	-4.2	0.00001	12	4.5	-5.7	10.8	
19	-4.1	0.00001	12	4.5	-5.8	10.7	
20	-4.1	0.00001	12	4.5	-5.8	10.7	
21	-4.0	0.00001	12	4.5	-6.2	10.3	25
22	-4.0	0.00001	12	4.5	-6.2	10.3	26
23	-3.9	0.00001	12	4.5	-6.2	10.3	27
24	-3.9	0.00001	12	4.5	-6.0	10.5	34
25	-3.8	0.00001	12	4.5	-6.0	10.5	35
26	-3.8	0.00001	12	4.5	-6.0	10.5	36

27	**-3.7**	**0.00001**	**12**	**4.5**	**-6.0**	**10.5**	
28	**-3.7**	**0.00001**	**12**	**4.5**	**-6.0**	**10.5**	
29	**-3.6**	**0.00001**	**12**	**4.5**	**-6.0**	**10.5**	
30	-3.6	0.00001	12	4.5	-5.0	11.5	
31	-3.5	0.00001	12	4.5	-5.2	11.3	
32	-3.5	0.00001	12	4.5	-5.0	11.5	
33	-3.4	0.00001	12	4.5	-4.8	11.7	
34	-3.4	0.00001	12	4.5	-5.0	11.5	
35	-3.3	0.00001	12	4.5	-5.4	11.1	
36	-3.3	0.00001	12	4.5	-7.2	9.3	6
37	-3.2	0.00001	12	4.5	-8.0	8.5	1
38	-3.2	0.00001	12	4.5	-8.0	8.5	2
39	-3.1	0.00001	12	4.5	-8.0	8.5	3
40	-3.1	0.00001	12	4.5	-8.0	8.5	4
41	-3.0	0.00001	12	4.5	-7.9	8.6	5
42	-3.0	0.00001	12	4.5	-7.2	9.3	7
43	-2.9	0.00001	12	4.5	-7.2	9.3	8
44	-2.9	0.00001	12	4.5	-6.7	9.8	14
45	-2.8	0.00001	12	4.5	-6.2	10.3	28
46	**-2.8**	**0.00001**	**12**	**4.5**	**-6.0**	**10.5**	
47	**-2.7**	**0.00001**	**12**	**4.5**	**-6.0**	**10.5**	
48	-2.7	0.00001	12	4.5	-5.8	10.7	
49	-2.6	0.00001	12	4.5	-5.8	10.7	
50	-2.6	0.00001	12	4.5	-5.8	10.7	
51	-2.5	0.00001	12	4.5	-5.4	11.1	
52	-2.5	0.00001	12	4.5	-5.0	11.5	
53	-2.4	0.00001	12	4.5	-5.0	11.5	
54	-2.4	0.00001	12	4.5	-5.0	11.5	
55	-2.3	0.00001	12	4.5	-4.6	11.9	
56	-2.3	0.00001	12	4.5	-4.8	11.7	
57	-2.2	0.00001	12	4.5	-5.1	11.4	
58	-2.2	0.00001	12	4.5	-5.2	11.3	
59	-2.1	0.00001	12	4.5	-5.4	11.1	
60	-2.1	0.00001	12	4.5	-5.8	10.7	
61	-2.0	0.00001	12	4.5	-5.8	10.7	
62	-2.0	0.00001	12	4.5	-6.4	10.1	23
63	-1.9	0.00001	12	4.5	-6.1	10.4	29
64	-1.9	0.00001	12	4.5	-5.4	11.1	
65	-1.8	0.00001	12	4.5	-5.3	11.2	
66	-1.8	0.00001	12	4.5	-5.5	11.0	
67	-1.7	0.00001	12	4.5	-5.6	10.9	
68	-1.7	0.00001	12	4.5	-5.5	11.0	
69	-1.6	0.00001	12	4.5	-5.4	11.1	
70	-1.6	0.00001	12	4.5	-4.5	12.0	
71	-1.5	0.00001	12	4.5	-5.8	10.7	
72	-1.5	0.00001	12	4.5	-4.4	12.1	
73	-1.4	0.00001	12	4.5	-4.9	11.6	
74	-1.4	0.00001	12	4.5	-4.9	11.6	
75	-1.3	0.00001	12	4.5	-5.1	11.4	
76	-1.3	0.00001	12	4.5	-5.2	11.3	

77	-1.2	0.00001	12	4.5	-5.1	11.4	
78	-1.2	0.00001	12	4.5	-5.4	11.1	
79	-1.1	0.00001	12	4.5	-5.6	10.9	
80	-1.1	0.00001	12	4.5	-5.6	10.9	
81	-1.0	0.00001	12	4.5	-5.6	10.9	
82	-1.0	0.00001	12	4.5	-5.9	10.6	
83	-0.9	0.00001	12	4.5	-6.5	10.0	20
84	-0.9	0.00001	12	4.5	-6.8	9.7	13
85	-0.8	0.00001	12	4.5	-6.9	9.6	9
86	-0.8	0.00001	12	4.5	-6.6	9.9	18
87	-0.7	0.00001	12	4.5	-6.9	9.6	10
88	-0.7	0.00001	12	4.5	-6.9	9.6	11
89	-0.6	0.00001	12	4.5	-6.9	9.6	12
90	-0.6	0.00001	12	4.5	-6.7	9.8	15
91	-0.5	0.00001	12	4.5	-6.7	9.8	16
92	-0.5	0.00001	12	4.5	-5.8	10.7	
93	-0.4	0.00001	12	4.5	-5.1	11.4	
94	-0.4	0.00001	12	4.5	-5.1	11.4	
95	-0.3	0.00001	12	4.5	-5.1	11.4	
96	-0.3	0.00001	12	4.5	-5.1	11.4	
97	-0.2	0.00001	12	4.5	-5.1	11.4	
98	-0.2	0.00001	12	4.5	-5.5	11.0	
99	-0.1	0.00001	12	4.5	-6.3	10.2	24
100	-0.1	0.00001	12	4.5	-6.7	9.8	17
101	0.0	0.00001	12	4.5	-6.5	10.0	21
102	0.1	0.00001	12	4.5	-6.6	9.9	19
103	0.1	0.00001	12	4.5	-6.5	10.0	22
104	0.2	0.00001	12	4.5	-5.7	10.8	
105	0.2	0.00001	12	4.5	-5.2	11.3	
106	0.3	0.00001	12	4.5	-5.0	11.5	
107	0.3	0.00001	12	4.5	-5.1	11.4	
108	0.4	0.00001	12	4.5	-5.3	11.2	
109	0.4	0.00001	12	4.5	-5.5	11.0	
110	0.5	0.00001	12	4.5	-5.5	11.0	
111	0.5	0.00001	12	4.5	-5.7	10.8	
112	0.6	0.00001	12	4.5	-5.7	10.8	
113	0.6	0.00001	12	4.5	-5.7	10.8	
114	0.7	0.00001	12	4.5	-5.7	10.8	
115	0.7	0.00001	12	4.5	-5.6	10.9	
116	0.8	0.00001	12	4.5	-6.1	10.4	30
117	0.8	0.00001	12	4.5	-6.1	10.4	31
118	0.9	0.00001	12	4.5	-6.1	10.4	32
119	0.9	0.00001	12	4.5	-6.1	10.4	33
120	1.0	0.00001	12	4.5	-5.5	11.0	
121	1.0	0.00001	12	4.5	-5.5	11.0	
122	1.1	0.00001	12	4.5	-5.3	11.2	
123	1.1	0.00001	12	4.5	-5.3	11.2	
124	1.2	0.00001	12	4.5	-4.8	11.7	
125	1.2	0.00001	12	4.5	-5.3	11.2	
126	1.3	0.00001	12	4.5	-5.3	11.2	

127	1.3	0.00001	12	4.5	-4.8	11.7	
128	1.4	0.00001	12	4.5	-4.7	11.8	
129	1.4	0.00001	12	4.5	-4.6	11.9	
130	1.5	0.00001	12	4.5	-4.9	11.6	
131	1.5	0.00001	12	4.5	-4.9	11.6	
132	1.6	0.00001	12	4.5	-5.5	11.0	
133	**1.6**	**0.00001**	**12**	**4.5**	**-6.0**	**10.5**	
134	1.7	0.00001	12	4.5	-5.8	10.7	
135	1.7	0.00001	12	4.5	-5.5	11.0	
136	1.8	0.00001	12	4.5	-5.4	11.1	
137	1.8	0.00001	12	4.5	-5.7	10.8	
138	1.9	0.00001	12	4.5	-5.7	10.8	
139	1.9	0.00001	12	4.5	-5.5	11.0	
140	2.0	0.00001	12	4.5	-5.7	10.8	
141	2.0	0.00001	12	4.5	-5.2	11.3	
142	2.1	0.00001	12	4.5	-4.7	11.8	
143	2.1	0.00001	12	4.5	-4.3	12.2	
144	2.2	0.00001	12	4.5	-4.2	12.3	
145	2.2	0.00001	12	4.5	-4.4	12.1	
146	2.3	0.00001	12	4.5	-4.9	11.6	
147	2.3	0.00001	12	4.5	-5.1	11.4	
148	2.4	0.00001	12	4.5	-5.1	11.4	
149	2.4	0.00001	12	4.5	-5.1	11.4	
150	2.5	0.00001	12	4.5	-5.1	11.4	
151	2.5	0.00001	12	4.5	-5.2	11.3	
152	2.6	0.00001	12	4.5	-5.3	11.2	
153	2.6	0.00001	12	4.5	-5.3	11.2	
154	2.7	0.00001	12	4.5	-5.4	11.1	
155	2.7	0.00001	12	4.5	-5.3	11.2	
156	2.8	0.00001	12	4.5	-5.4	11.1	
157	2.8	0.00001	12	4.5	-5.4	11.1	
158	2.9	0.00001	12	4.5	-5.5	11.0	
159	2.9	0.00001	12	4.5	-5.8	10.7	
160	3.0	0.00001	12	4.5	-5.9	10.6	
161	3.0	0.00001	12	4.5	-5.9	10.6	
162	3.1	0.00001	12	4.5	-5.9	10.6	
163	3.1	0.00001	12	4.5	-5.5	11.0	
164	3.2	0.00001	12	4.5	-5.5	11.0	
165	3.2	0.00001	12	4.5	-5.5	11.0	
166	3.3	0.00001	12	4.5	-5.7	10.8	
167	3.3	0.00001	12	4.5	-5.7	10.8	
168	3.4	0.00001	12	4.5	-5.7	10.8	
169	3.4	0.00001	12	4.5	-5.6	10.9	
170	3.5	0.00001	12	4.5	-5.9	10.6	
171	3.5	0.00001	12	4.5	-5.9	10.6	
172	3.6	0.00001	12	4.5	-5.5	11.0	
173	3.6	0.00001	12	4.5	-5.5	11.0	
174	3.7	0.00001	12	4.5	-5.5	11.0	
175	3.7	0.00001	12	4.5	-5.5	11.0	
176	3.8	0.00001	12	4.5	-5.5	11.0	

177	3.8	0.00001	12	4.5	-4.8	11.7	
178	3.9	0.00001	12	4.5	-4.9	11.6	
179	3.9	0.00001	12	4.5	-4.9	11.6	
180	4.0	0.00001	12	4.5	-4.9	11.6	
181	4.0	0.00001	12	4.5	-4.9	11.6	
182	4.1	0.00001	12	4.5	-4.9	11.6	
183	4.1	0.00001	12	4.5	-4.5	12.0	
184	4.2	0.00001	12	4.5	-4.5	12.0	
185	4.2	0.00001	12	4.5	-4.1	12.4	
186	4.3	0.00001	12	4.5	-4.1	12.4	
187	4.3	0.00001	12	4.5	-3.9	12.6	
188	4.4	0.00001	12	4.5	-3.9	12.6	
189	4.4	0.00001	12	4.5	-3.9	12.6	
190	4.5	0.00001	12	4.5	-3.9	12.6	
191	4.5	0.00001	12	4.5	-3.7	12.8	
192	4.6	0.00001	12	4.5	-3.7	12.8	
193	4.6	0.00001	12	4.5	-3.7	12.8	
194	4.7	0.00001	12	4.5	-3.7	12.8	
195	4.7	0.00001	12	4.5	-3.7	12.8	
196	4.8	0.00001	12	4.5	-3.7	12.8	
197	4.8	0.00001	12	4.5	-3.7	12.8	
198	4.9	0.00001	12	4.5	-3.7	12.8	
199	4.9	0.00001	12	4.5	-3.7	12.8	
200	5.0	0.00001	12	4.5	-3.7	12.8	
201	5.0	0.00001	12	4.5	-3.3	13.2	

Channel #18, Fc = 2464.8750 MHz	**Data Rate = 0.818 Mbps (DQPSK), Narrow**
Chip Rate = 4.5 MHz	**PN Code Length = 11 chips/symbol**
6 dB BW = 4 MHz	

(S/N)o = 12 dB per attached Figure 4.5.1

Measured Processing Gain Gp = (S/N)o + Lsys + Mj = 15 + 2 + Mj = 17 + Mj (dB)

Theoretical Calculated Processing Gain = Chip Rate/Data rate = 4.5 MHz / (0.818 Mb/s)/(2 bits/symbol) = 11 or 10.4 dB

Note:

- Total Peak Power from the EUT's Tx measured at the EUT's Rx Input: P_t = -49.9 dBm
- Jamming signal level at measured at the EUT's receiver input: J
- Mj = J-P_t
- The following shaded boxes are discarded worst measurements (18.8% of total measurement points)

SUMMARY OF TEST RESULTS	
Theoretical Process Gain	**10.4 dB**
Minimum Measured Process Gain with discard of 18.8% of the worst measurements	**10.7 dB**

Test Point	Jammer Signal Freq. +/- Fc (MHz)	(BER) (DQPSK)	(S/N)o (dB)	System Loss Lsys (dB)	Jammer to Signal Ratio Mj (dB)	Measured Processing Gain (dB)	Discarded Readings
1	-2.50	0.00001	12	4.5	-1.0	15.5	
2	-2.45	0.00001	12	4.5	-1.1	15.4	
3	-2.40	0.00001	12	4.5	-0.1	16.4	
4	-2.35	0.00001	12	4.5	0.0	16.5	
5	-2.30	0.00001	12	4.5	0.8	17.3	
6	-2.25	0.00001	12	4.5	1.3	17.8	
7	-2.20	0.00001	12	4.5	2.1	18.6	
8	-2.15	0.00001	12	4.5	1.6	18.1	
9	-2.10	0.00001	12	4.5	1.0	17.5	
10	-2.05	0.00001	12	4.5	0.2	16.7	
11	-2.00	0.00001	12	4.5	-0.4	16.1	
12	-1.95	0.00001	12	4.5	-1.7	14.8	
13	-1.90	0.00001	12	4.5	-1.6	14.9	
14	-1.85	0.00001	12	4.5	-1.3	15.2	
15	-1.80	0.00001	12	4.5	0.4	16.9	
16	-1.75	0.00001	12	4.5	0.6	17.1	
17	-1.70	0.00001	12	4.5	0.6	17.1	
18	-1.65	0.00001	12	4.5	0.1	16.6	
19	-1.60	0.00001	12	4.5	0.1	16.6	
20	-1.55	0.00001	12	4.5	0.5	17.0	
21	-1.50	0.00001	12	4.5	0.6	17.1	
22	-1.45	0.00001	12	4.5	0.6	17.1	
23	-1.40	0.00001	12	4.5	2.0	18.5	

Continued …

Test Point	Jammer Signal Freq. +/- Fc	(BER) (DQPSK)	(S/N)o	System Loss Lsys	Jammer to Signal Ratio Mj	Measured Processing Gain	Discarded Readings
24	-1.35	0.00001	12	4.5	1.9	18.4	
25	-1.30	0.00001	12	4.5	2.1	18.6	
26	-1.25	0.00001	12	4.5	2.0	18.5	
27	-1.20	0.00001	12	4.5	2.4	18.9	
28	-1.15	0.00001	12	4.5	2.4	18.9	
29	-1.10	0.00001	12	4.5	2.4	18.9	
30	-1.05	0.00001	12	4.5	3.0	19.5	
31	-1.00	0.00001	12	4.5	-4.1	12.4	
32	-0.95	0.00001	12	4.5	-5.7	10.8	
33	-0.90	0.00001	12	4.5	-5.6	10.9	
34	-0.85	0.00001	12	4.5	-5.2	11.3	
35	-0.80	0.00001	12	4.5	-5.6	10.9	
36	-0.75	0.00001	12	4.5	-5.5	11.0	
37	-0.70	0.00001	12	4.5	-6.4	10.1	9
38	-0.65	0.00001	12	4.5	-5.9	10.6	15
39	-0.60	0.00001	12	4.5	-5.2	11.3	
40	-0.55	0.00001	12	4.5	-4.5	12.0	
41	-0.50	0.00001	12	4.5	-5.0	11.5	
42	**-0.45**	**0.00001**	**12**	**4.5**	**-5.8**	**10.7**	
43	-0.40	0.00001	12	4.5	-6.3	10.2	10
44	-0.35	0.00001	12	4.5	-5.6	10.9	
45	-0.30	0.00001	12	4.5	-6.1	10.4	13
46	-0.25	0.00001	12	4.5	-6.8	9.7	2
47	-0.20	0.00001	12	4.5	-5.5	11.0	
48	-0.15	0.00001	12	4.5	-4.9	11.6	
49	-0.10	0.00001	12	4.5	-4.7	11.8	
50	-0.05	0.00001	12	4.5	-4.4	12.1	
51	0.00	0.00001	12	4.5	-6.6	9.9	4
52	0.05	0.00001	12	4.5	-4.8	11.7	
53	0.10	0.00001	12	4.5	-4.5	12.0	
54	0.15	0.00001	12	4.5	-3.9	12.6	
55	0.20	0.00001	12	4.5	-4.4	12.1	
56	0.25	0.00001	12	4.5	-5.1	11.4	
57	0.30	0.00001	12	4.5	-6.5	10.0	6
58	0.35	0.00001	12	4.5	-4.9	11.6	
59	0.40	0.00001	12	4.5	-4.5	12.0	
60	0.45	0.00001	12	4.5	-5.3	11.2	
61	0.50	0.00001	12	4.5	-4.5	12.0	
62	0.55	0.00001	12	4.5	-6.3	10.2	11
63	0.60	0.00001	12	4.5	-6.5	10.0	7
64	0.65	0.00001	12	4.5	-5.7	10.8	
65	0.70	0.00001	12	4.5	-5.6	10.9	
66	0.75	0.00001	12	4.5	-6.1	10.4	14

Continued …

Test Point	Jammer Signal Freq. +/- Fc	(BER) (DQPSK)	(S/N)o	System Loss Lsys	Jammer to Signal Ratio Mj	Measured Processing Gain	Discarded Readings
67	0.80	0.00001	12	4.5	-5.2	11.3	
68	0.85	0.00001	12	4.5	-5.2	11.3	
69	0.90	0.00001	12	4.5	-5.2	11.3	
70	0.95	0.00001	12	4.5	-4.6	11.9	
71	1.00	0.00001	12	4.5	-4.6	11.9	
72	1.05	0.00001	12	4.5	-6.5	10.0	8
73	1.10	0.00001	12	4.5	-6.7	9.8	3
74	**1.15**	**0.00001**	**12**	**4.5**	**-5.8**	**10.7**	
75	1.20	0.00001	12	4.5	-6.6	9.9	5
76	1.25	0.00001	12	4.5	-7.0	9.5	1
77	1.30	0.00001	12	4.5	-6.3	10.2	12
78	1.35	0.00001	12	4.5	-5.9	10.6	16
79	1.40	0.00001	12	4.5	-5.9	10.6	17
80	1.45	0.00001	12	4.5	-5.9	10.6	18
81	**1.50**	**0.00001**	**12**	**4.5**	**-5.8**	**10.7**	
82	1.55	0.00001	12	4.5	-5.9	10.6	19
83	**1.60**	**0.00001**	**12**	**4.5**	**-5.8**	**10.7**	
84	1.65	0.00001	12	4.5	-5.7	10.8	
85	1.70	0.00001	12	4.5	-4.8	11.7	
86	1.75	0.00001	12	4.5	-4.4	12.1	
87	1.80	0.00001	12	4.5	-4.4	12.1	
88	1.85	0.00001	12	4.5	-4.4	12.1	
89	1.90	0.00001	12	4.5	-4.4	12.1	
90	1.95	0.00001	12	4.5	-4.3	12.2	
91	2.00	0.00001	12	4.5	-5.2	11.3	
92	2.05	0.00001	12	4.5	-3.3	13.2	
93	2.10	0.00001	12	4.5	-0.8	15.7	
94	2.15	0.00001	12	4.5	0.7	17.2	
95	2.20	0.00001	12	4.5	0.9	17.4	
96	2.25	0.00001	12	4.5	0.9	17.4	
97	2.30	0.00001	12	4.5	1.2	17.7	
98	2.35	0.00001	12	4.5	1.0	17.5	
99	2.40	0.00001	12	4.5	0.6	17.1	
100	2.45	0.00001	12	4.5	1.0	17.5	
101	2.50	0.00001	12	4.5	1.0	17.5	

Test Point	Jammer Signal Freq. +/- Fc (MHz)	(BER) (DQPSK)	(S/N)o (dB)	System Loss Lsys (dB)	Jammer to Signal Ratio Mj (dB)	Measured Processing Gain (dB)
23	-1.40	0.00001	15.0	2.0	2.0	19.0
24	-1.35	0.00001	15.0	2.0	1.9	18.9
25	-1.30	0.00001	15.0	2.0	2.1	19.1
26	-1.25	0.00001	15.0	2.0	2.0	19.0
27	-1.20	0.00001	15.0	2.0	2.4	19.4
28	-1.15	0.00001	15.0	2.0	2.4	19.4
29	-1.10	0.00001	15.0	2.0	2.4	19.4
30	-1.05	0.00001	15.0	2.0	3.0	20.0
31	-1.00	0.00001	15.0	2.0	-4.1	12.9
32	-0.95	0.00001	15.0	2.0	-5.7	11.3
33	-0.90	0.00001	15.0	2.0	-5.6	11.4
34	-0.85	0.00001	15.0	2.0	-5.2	11.8
35	-0.80	0.00001	15.0	2.0	-5.6	11.4
36	-0.75	0.00001	15.0	2.0	-5.5	11.5
37	-0.70	0.00001	15.0	2.0	-6.4	10.6
38	-0.65	0.00001	15.0	2.0	-5.9	11.1
39	-0.60	0.00001	15.0	2.0	-5.2	11.8
40	-0.55	0.00001	15.0	2.0	-4.5	12.5
41	-0.50	0.00001	15.0	2.0	-5.0	12.0
42	**-0.45**	**0.00001**	**15.0**	**2.0**	**-5.8**	**11.2**
43	-0.40	0.00001	15.0	2.0	-6.3	10.7
44	-0.35	0.00001	15.0	2.0	-5.6	11.4
45	-0.30	0.00001	15.0	2.0	-6.1	10.9
46	-0.25	0.00001	15.0	2.0	-6.8	10.2
47	-0.20	0.00001	15.0	2.0	-5.5	11.5
48	-0.15	0.00001	15.0	2.0	-4.9	12.1
49	-0.10	0.00001	15.0	2.0	-4.7	12.3
50	-0.05	0.00001	15.0	2.0	-4.4	12.6
51	0.00	0.00001	15.0	2.0	-6.6	10.4
52	0.05	0.00001	15.0	2.0	-4.8	12.2
53	0.10	0.00001	15.0	2.0	-4.5	12.5
54	0.15	0.00001	15.0	2.0	-3.9	13.1
55	0.20	0.00001	15.0	2.0	-4.4	12.6
56	0.25	0.00001	15.0	2.0	-5.1	11.9
57	0.30	0.00001	15.0	2.0	-6.5	10.5
58	0.35	0.00001	15.0	2.0	-4.9	12.1
59	0.40	0.00001	15.0	2.0	-4.5	12.5
60	0.45	0.00001	15.0	2.0	-5.3	11.7
61	0.50	0.00001	15.0	2.0	-4.5	12.5
62	0.55	0.00001	15.0	2.0	-6.3	10.7
63	0.60	0.00001	15.0	2.0	-6.5	10.5

Continued ..

Test Point	Jammer Signal Freq. +/- Fc (MHz)	(BER) (DQPSK)	(S/N)o (dB)	System Loss Lsys (dB)	Jammer to Signal Ratio Mj (dB)	Measured Processing Gain (dB)
64	0.65	0.00001	15.0	2.0	-5.7	11.3
65	0.70	0.00001	15.0	2.0	-5.6	11.4
66	0.75	0.00001	15.0	2.0	-6.1	10.9
67	0.80	0.00001	15.0	2.0	-5.2	11.8
68	0.85	0.00001	15.0	2.0	-5.2	11.8
69	0.90	0.00001	15.0	2.0	-5.2	11.8
70	0.95	0.00001	15.0	2.0	-4.6	12.4
71	1.00	0.00001	15.0	2.0	-4.6	12.4
72	1.05	0.00001	15.0	2.0	-6.5	10.5
73	1.10	0.00001	15.0	2.0	-6.7	10.3
74	1.15	0.00001	15.0	2.0	-5.8	11.2
75	1.20	0.00001	15.0	2.0	-6.6	10.4
76	1.25	0.00001	15.0	2.0	-7.0	10.0
77	1.30	0.00001	15.0	2.0	-6.3	10.7
78	1.35	0.00001	15.0	2.0	-5.9	11.1
79	1.40	0.00001	15.0	2.0	-5.9	11.1
80	1.45	0.00001	15.0	2.0	-5.9	11.1
81	**1.50**	**0.00001**	**15.0**	**2.0**	**-5.8**	**11.2**
82	1.55	0.00001	15.0	2.0	-5.9	11.1
83	**1.60**	**0.00001**	**15.0**	**2.0**	**-5.8**	**11.2**
84	1.65	0.00001	15.0	2.0	-5.7	11.3
85	1.70	0.00001	15.0	2.0	-4.8	12.2
86	1.75	0.00001	15.0	2.0	-4.4	12.6
87	1.80	0.00001	15.0	2.0	-4.4	12.6
88	1.85	0.00001	15.0	2.0	-4.4	12.6
89	1.90	0.00001	15.0	2.0	-4.4	12.6
90	1.95	0.00001	15.0	2.0	-4.3	12.7
91	2.00	0.00001	15.0	2.0	-5.2	11.8
92	2.05	0.00001	15.0	2.0	-3.3	13.7
93	2.10	0.00001	15.0	2.0	-0.8	16.2
94	2.15	0.00001	15.0	2.0	0.7	17.7
95	2.20	0.00001	15.0	2.0	0.9	17.9
96	2.25	0.00001	15.0	2.0	0.9	17.9
97	2.30	0.00001	15.0	2.0	1.2	18.2
98	2.35	0.00001	15.0	2.0	1.0	18.0
99	2.40	0.00001	15.0	2.0	0.6	17.6
100	2.45	0.00001	15.0	2.0	1.0	18.0
101	2.50	0.00001	15.0	2.0	1.0	18.0