



## Processing Gain

The processing gain for the WhereNet system is measured using the CW jamming margin method as described in CFR 47 Part 15.247(e)(2) where  $G_p = S/N_0 + M_j + L_{sys}$ . For this system, the BER requirements are derived from the required message error rate because the direct sequence spread spectrum (DSSS) receiver can provide metrics for message errors, but not actual bit errors. (The system uses burst transmissions, and the bursts are discarded if a single bit error occurs.)

The processing gain of the WhereNet system is:

$$\begin{aligned} G_p &= 10 \times \text{Log}(\text{Chip rate} / \text{Data rate}) \\ &= 10 \times \text{Log}(30.52\text{M} / 59.73\text{K}) \\ &= 10 \times \text{Log}(511) \\ &= 27 \text{ dB} \end{aligned}$$

The remainder of this memo includes the derivation of the  $S/N_0$  of the WhereNet System, a description of the test setup and procedure, a summary of the results of the testing, and an attachment which contains the detailed data from the test.

WhereNet's RTLS system uses a 48-bit message length. The nature of the WhereNet System is such that was not practical to directly measure processing gain by observing signal to noise ratio at the output of the receiver's demodulator with and without the presence DSSS spreading code. The Location Sensor's logic does not permit it to be placed in a continuous DSSS test mode as is available in the Handheld Communicator. Therefore we chose to make the CW jammer measurement using the WhereNet HPC-



2000-00AA Handheld Communicator. This was because the Handheld Communicator could be placed in a mode where it repeated its DSSS message in a loop at a rapid rate. The transmit circuitry in the LAP-4200 and LOS-4100 blinks randomly at a much slower rate. This made it impractical to measure the required 1220 data points in a reasonable timeframe. The WhereNet Location Sensors models LAP-4200 and LOS-4100 and the HPC-2000-00AA Handheld Communicator have identical RFIC based transmitters, employ the same parts and transmit identical DSSS protocols. They are both used with and demodulated by the same receiver. Because the Location Sensor and Handheld are essentially identical DSSS emitters, we are submitting data for the Handheld only and request that it be applied to the Location Sensor.

The data below was measured with the Model HPC-2000-00AA Handheld Communicator. The receiver used for this test is a WhereNet model FEC-3500-00AA, which contains the same receiver demodulator as the Location Sensors. The result of the test is a measured processing gain of 15.9 dB. This result satisfies the CFR 47 Part 15.247 requirement of a minimum of 10 dB of processing gain.

### **BER Requirements Derivation**

A message throughput rate of 75 percent is acceptable for reliable operations. The burst transmission consists of 48 bits and a *single bit error will cause a message error*. The message error rate is related to the BER by a simple probability equation. The probability of having zero bits in error out of a 48-bit transmission is given by,

$$P_m = (1 - P_b)^L$$



Where,

$P_m$  is the probability of receiving a message without errors

$P_b$  is the bit error rate probability or BER

$L$  is the length of the message

Solving for  $P_b$ , given  $P_m = 75\%$ , we have,

$$P_b = 1 - (P_m)^{(1/L)} \text{ or,}$$

$$P_b = 1 - (.75)^{(1/44)} = 0.00598$$

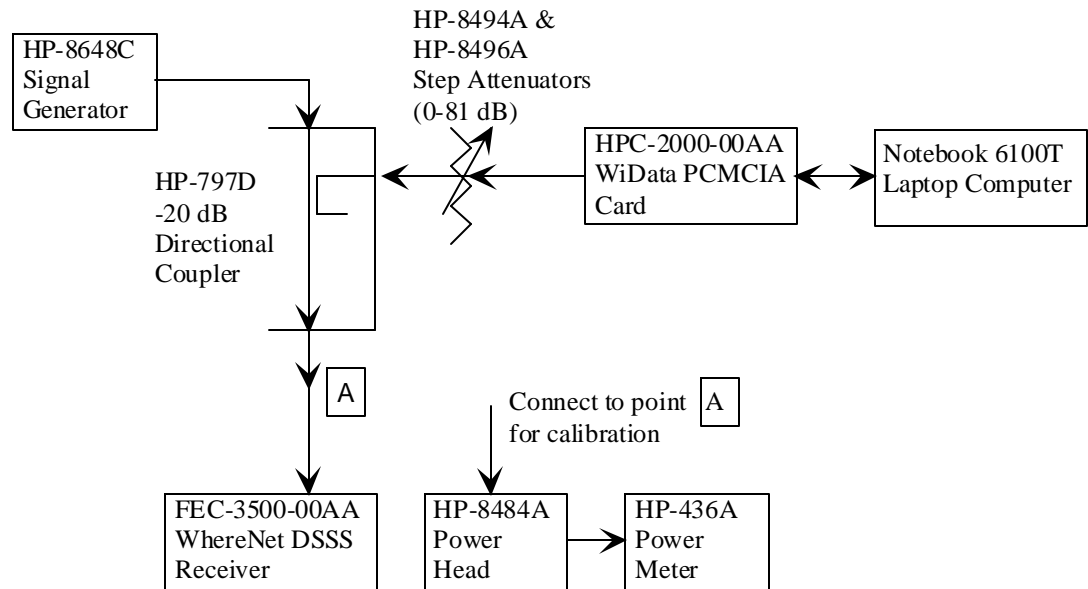
### **Test Setup and Procedure**

The processing gain test set-up consists of the following equipment connected as shown below.

- WhereNet Model HPC-2000-00AA Handheld Communicator (Unit Under Test)
- Notebook Model 6100T Laptop Computer to control UUT
- HP-8648C Signal Generator
- HP 436A Power mMeter and HP 8484A Power Sensor
- HP-797D Directional Coupler
- HP 8494A and HP8496A Step Attenuators
- WhereNet Model FEC-3500-00AA DSSS Receiver



**Test Setup Diagram**



**Test Procedure**

The test was conducted by first putting the Handheld Communicator in a continuous DSSS test mode and measuring the power level on the power meter. The jammer level was then set to 0 dB relative to the carrier level and measured using the power meter and the signal generator’s internal attenuator. A step attenuator was used to adjust the jammer level relative to the signal. The Handheld Communicator left in the continuous DSSS test mode. Message error rate software was written to record the number of good messages received in a group of 128 messages. The passband of the system is +/- 30.5 MHz, so there are  $61 \text{ MHz} / 50 \text{ KHz} = 1220$  test points across the passband of the system. The jammer frequency was set to the lowest frequency in the passband, and the



jammer level was adjusted until the good message rate measured 96/128 for the nominal 75 % throughput. The jammer was then stepped across the passband in 50 KHz increments and the highest jammer level which still allowed 75% throughput was logged at each frequency. This information was recorded in an Excel spreadsheet.

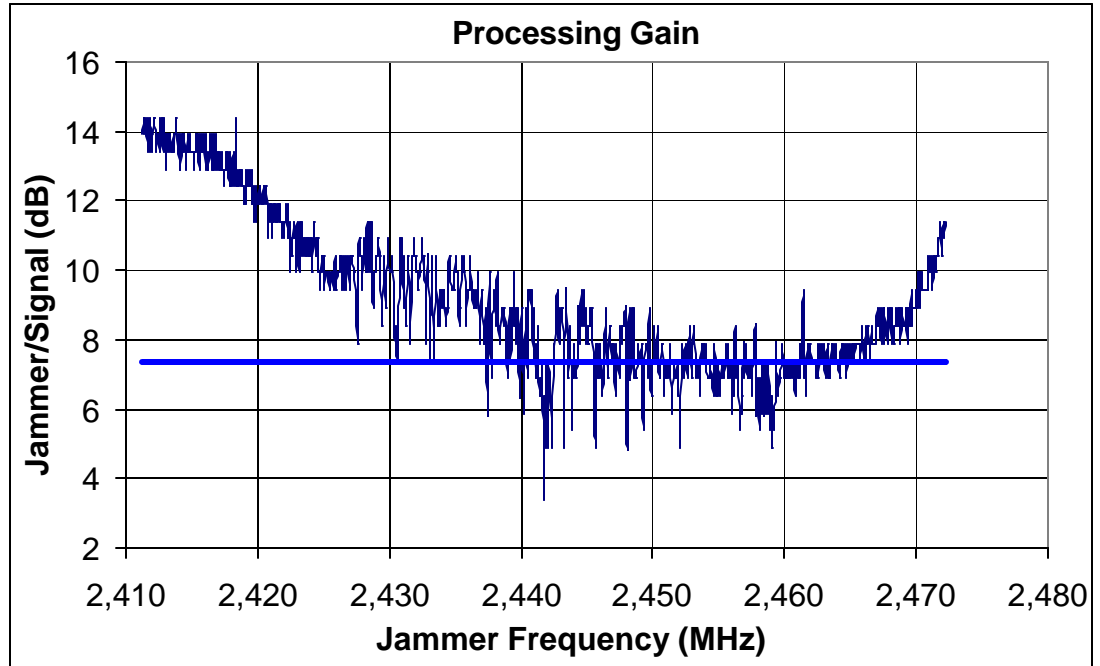
### Test Results

Using the jamming margin method, the processing gain (in dB) is defined as  $G_p = S/N + M_j + L_{sys}$ . The required S/N, was derived from the equation  $P_b = \frac{1}{2} \exp(-S/N)$  for non coherent DBPSK waveforms. Using the BER of 0.00598 determined above resulted in a S/N of 6.5 dB. To determine  $M_j$ , the test data from the jamming margin test was utilized. An Excel Spreadsheet showing the maximum J/S ratio which allowed a good message rate of 75 % for each of the 1220 frequencies in the passband has been submitted as a separate document. A graph summarizing this data is shown in Attachment A. After removing the J/S ratios of the worst 20 %, the lowest remaining J/S level is 7.4 dB. Given the design parameters of this system,  $L_{sys}$  was estimated to be 2 dB. Combining these results, the measured processing gain is:

$$\text{Measured Processing Gain} = 6.5 \text{ dB} + 7.4 \text{ dB} + 2 \text{ dB} = 15.9 \text{ dB}$$



Test Data



Lowest J/S after omitting worst 20% is 7.4 dB

Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,411.25	-64.4	-50.5	13.9
2,411.30	-64.4	-50.0	14.4
2,411.35	-64.4	-50.5	13.9
2,411.40	-64.4	-50.0	14.4
2,411.45	-64.4	-50.5	13.9
2,411.50	-64.4	-50.5	13.9
2,411.55	-64.4	-50.0	14.4
2,411.60	-64.4	-51.0	13.4

Location Sensor Model LOS-4100, LAP-4200



Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,411.65	-64.4	-50.0	14.4
2,411.70	-64.4	-50.5	13.9
2,411.75	-64.4	-51.0	13.4
2,411.80	-64.4	-50.5	13.9
2,411.85	-64.4	-50.0	14.4
2,411.90	-64.4	-50.5	13.9
2,411.95	-64.4	-50.5	13.9
2,412.00	-64.4	-51.0	13.4
2,412.05	-64.4	-50.0	14.4
2,412.10	-64.4	-50.0	14.4
2,412.15	-64.4	-50.0	14.4
2,412.20	-64.4	-50.5	13.9
2,412.25	-64.4	-50.5	13.9
2,412.30	-64.4	-51.0	13.4
2,412.35	-64.4	-50.5	13.9
2,412.40	-64.4	-50.5	13.9
2,412.45	-64.4	-50.5	13.9
2,412.50	-64.4	-51.0	13.4
2,412.55	-64.4	-50.5	13.9
2,412.60	-64.4	-50.0	14.4
2,412.65	-64.4	-50.5	13.9
2,412.70	-64.4	-50.0	14.4
2,412.75	-64.4	-50.0	14.4
2,412.80	-64.4	-50.5	13.9
2,412.85	-64.4	-51.0	13.4
2,412.90	-64.4	-50.0	14.4
2,412.95	-64.4	-50.5	13.9
2,413.00	-64.4	-50.5	13.9
2,413.05	-64.4	-51.5	12.9
2,413.10	-64.4	-50.5	13.9
2,413.15	-64.4	-50.5	13.9
2,413.20	-64.4	-50.5	13.9
2,413.25	-64.4	-51.0	13.4
2,413.30	-64.4	-50.5	13.9
2,413.35	-64.4	-51.0	13.4
2,413.40	-64.4	-50.5	13.9
2,413.45	-64.4	-51.0	13.4
2,413.50	-64.4	-51.0	13.4
2,413.55	-64.4	-51.0	13.4
2,413.60	-64.4	-50.5	13.9
2,413.65	-64.4	-51.0	13.4

Location Sensor Model LOS-4100, LAP-4200



Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,413.70	-64.4	-50.5	13.9
2,413.75	-64.4	-50.5	13.9
2,413.80	-64.4	-50.0	14.4
2,413.85	-64.4	-50.0	14.4
2,413.90	-64.4	-51.0	13.4
2,413.95	-64.4	-51.0	13.4
2,414.00	-64.4	-50.5	13.9
2,414.05	-64.4	-51.5	12.9
2,414.10	-64.4	-50.5	13.9
2,414.15	-64.4	-51.5	12.9
2,414.20	-64.4	-51.0	13.4
2,414.25	-64.4	-51.0	13.4
2,414.30	-64.4	-50.5	13.9
2,414.35	-64.4	-50.5	13.9
2,414.40	-64.4	-51.0	13.4
2,414.45	-64.4	-50.5	13.9
2,414.50	-64.4	-51.0	13.4
2,414.55	-64.4	-51.0	13.4
2,414.60	-64.4	-51.5	12.9
2,414.65	-64.4	-50.5	13.9
2,414.70	-64.4	-51.0	13.4
2,414.75	-64.4	-51.0	13.4
2,414.80	-64.4	-50.5	13.9
2,414.85	-64.4	-51.0	13.4
2,414.90	-64.4	-51.0	13.4
2,414.95	-64.4	-51.0	13.4
2,415.00	-64.4	-51.0	13.4
2,415.05	-64.4	-51.0	13.4
2,415.10	-64.4	-51.0	13.4
2,415.15	-64.4	-51.5	12.9
2,415.20	-64.4	-51.0	13.4
2,415.25	-64.4	-51.0	13.4
2,415.30	-64.4	-50.5	13.9
2,415.35	-64.4	-50.5	13.9
2,415.40	-64.4	-50.5	13.9
2,415.45	-64.4	-51.0	13.4
2,415.50	-64.4	-51.0	13.4
2,415.55	-64.4	-51.5	12.9
2,415.60	-64.4	-51.0	13.4
2,415.65	-64.4	-50.5	13.9
2,415.70	-64.4	-51.0	13.4



Location Sensor Model LOS-4100, LAP-4200



Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,415.75	-64.4	-51.0	13.4
2,415.80	-64.4	-50.5	13.9
2,415.85	-64.4	-51.0	13.4
2,415.90	-64.4	-51.0	13.4
2,415.95	-64.4	-50.5	13.9
2,416.00	-64.4	-51.5	12.9
2,416.05	-64.4	-51.0	13.4
2,416.10	-64.4	-50.5	13.9
2,416.15	-64.4	-51.5	12.9
2,416.20	-64.4	-51.0	13.4
2,416.25	-64.4	-51.5	12.9
2,416.30	-64.4	-51.0	13.4
2,416.35	-64.4	-50.5	13.9
2,416.40	-64.4	-51.0	13.4
2,416.45	-64.4	-51.0	13.4
2,416.50	-64.4	-50.5	13.9
2,416.55	-64.4	-51.5	12.9
2,416.60	-64.4	-51.5	12.9
2,416.65	-64.4	-50.5	13.9
2,416.70	-64.4	-51.0	13.4
2,416.75	-64.4	-51.5	12.9
2,416.80	-64.4	-51.0	13.4
2,416.85	-64.4	-50.5	13.9
2,416.90	-64.4	-51.5	12.9
2,416.95	-64.4	-51.0	13.4
2,417.00	-64.4	-51.0	13.4
2,417.05	-64.4	-51.5	12.9
2,417.10	-64.4	-51.0	13.4
2,417.15	-64.4	-51.5	12.9
2,417.20	-64.4	-51.5	12.9
2,417.25	-64.4	-51.0	13.4
2,417.30	-64.4	-51.5	12.9
2,417.35	-64.4	-51.5	12.9
2,417.40	-64.4	-52.0	12.4
2,417.45	-64.4	-51.5	12.9
2,417.50	-64.4	-51.5	12.9
2,417.55	-64.4	-51.5	12.9
2,417.60	-64.4	-51.5	12.9
2,417.65	-64.4	-51.0	13.4
2,417.70	-64.4	-51.0	13.4
2,417.75	-64.4	-51.5	12.9

Location Sensor Model LOS-4100, LAP-4200



Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,417.80	-64.4	-51.5	12.9
2,417.85	-64.4	-52.0	12.4
2,417.90	-64.4	-52.0	12.4
2,417.95	-64.4	-51.0	13.4
2,418.00	-64.4	-51.5	12.9
2,418.05	-64.4	-52.0	12.4
2,418.10	-64.4	-51.5	12.9
2,418.15	-64.4	-51.0	13.4
2,418.20	-64.4	-51.5	12.9
2,418.25	-64.4	-52.0	12.4
2,418.30	-64.4	-51.5	12.9
2,418.35	-64.4	-50.0	14.4
2,418.40	-64.4	-52.0	12.4
2,418.45	-64.4	-52.0	12.4
2,418.50	-64.4	-51.5	12.9
2,418.55	-64.4	-52.0	12.4
2,418.60	-64.4	-51.5	12.9
2,418.65	-64.4	-52.0	12.4
2,418.70	-64.4	-51.5	12.9
2,418.75	-64.4	-51.5	12.9
2,418.80	-64.4	-52.0	12.4
2,418.85	-64.4	-52.0	12.4
2,418.90	-64.4	-52.0	12.4
2,418.95	-64.4	-52.5	11.9
2,419.00	-64.4	-52.5	11.9
2,419.05	-64.4	-52.5	11.9
2,419.10	-64.4	-52.0	12.4
2,419.15	-64.4	-51.5	12.9
2,419.20	-64.4	-52.0	12.4
2,419.25	-64.4	-51.5	12.9
2,419.30	-64.4	-52.0	12.4
2,419.35	-64.4	-52.0	12.4
2,419.40	-64.4	-51.5	12.9
2,419.45	-64.4	-52.0	12.4
2,419.50	-64.4	-51.5	12.9
2,419.55	-64.4	-52.5	11.9
2,419.60	-64.4	-52.5	11.9
2,419.65	-64.4	-52.5	11.9
2,419.70	-64.4	-52.0	12.4
2,419.75	-64.4	-53.0	11.4
2,419.80	-64.4	-52.5	11.9

Location Sensor Model LOS-4100, LAP-4200



Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,419.85	-64.4	-53.0	11.4
2,419.90	-64.4	-52.0	12.4
2,419.95	-64.4	-52.5	11.9
2,420.00	-64.4	-52.5	11.9
2,420.05	-64.4	-52.5	11.9
2,420.10	-64.4	-52.0	12.4
2,420.15	-64.4	-52.5	11.9
2,420.20	-64.4	-52.0	12.4
2,420.25	-64.4	-52.5	11.9
2,420.30	-64.4	-52.5	11.9
2,420.35	-64.4	-52.5	11.9
2,420.40	-64.4	-52.0	12.4
2,420.45	-64.4	-52.5	11.9
2,420.50	-64.4	-52.0	12.4
2,420.55	-64.4	-52.5	11.9
2,420.60	-64.4	-52.0	12.4
2,420.65	-64.4	-52.0	12.4
2,420.70	-64.4	-52.5	11.9
2,420.75	-64.4	-53.0	11.4
2,420.80	-64.4	-53.5	10.9
2,420.85	-64.4	-52.5	11.9
2,420.90	-64.4	-52.5	11.9
2,420.95	-64.4	-53.0	11.4
2,421.00	-64.4	-52.5	11.9
2,421.05	-64.4	-53.5	10.9
2,421.10	-64.4	-53.0	11.4
2,421.15	-64.4	-53.0	11.4
2,421.20	-64.4	-52.5	11.9
2,421.25	-64.4	-52.5	11.9
2,421.30	-64.4	-53.0	11.4
2,421.35	-64.4	-52.5	11.9
2,421.40	-64.4	-53.0	11.4
2,421.45	-64.4	-53.0	11.4
2,421.50	-64.4	-52.5	11.9
2,421.55	-64.4	-52.5	11.9
2,421.60	-64.4	-52.5	11.9
2,421.65	-64.4	-53.0	11.4
2,421.70	-64.4	-53.0	11.4
2,421.75	-64.4	-53.0	11.4
2,421.80	-64.4	-53.0	11.4
2,421.85	-64.4	-53.5	10.9

Location Sensor Model LOS-4100, LAP-4200



Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,421.90	-64.4	-53.0	11.4
2,421.95	-64.4	-53.5	10.9
2,422.00	-64.4	-53.0	11.4
2,422.05	-64.4	-53.0	11.4
2,422.10	-64.4	-53.0	11.4
2,422.15	-64.4	-52.5	11.9
2,422.20	-64.4	-53.5	10.9
2,422.25	-64.4	-52.5	11.9
2,422.30	-64.4	-53.5	10.9
2,422.35	-64.4	-53.0	11.4
2,422.40	-64.4	-54.5	9.9
2,422.45	-64.4	-53.5	10.9
2,422.50	-64.4	-54.0	10.4
2,422.55	-64.4	-54.0	10.4
2,422.60	-64.4	-53.5	10.9
2,422.65	-64.4	-54.0	10.4
2,422.70	-64.4	-53.0	11.4
2,422.75	-64.4	-53.5	10.9
2,422.80	-64.4	-53.5	10.9
2,422.85	-64.4	-53.5	10.9
2,422.90	-64.4	-54.5	9.9
2,422.95	-64.4	-53.5	10.9
2,423.00	-64.4	-53.0	11.4
2,423.05	-64.4	-54.0	10.4
2,423.10	-64.4	-54.0	10.4
2,423.15	-64.4	-54.5	9.9
2,423.20	-64.4	-53.5	10.9
2,423.25	-64.4	-53.0	11.4
2,423.30	-64.4	-53.0	11.4
2,423.35	-64.4	-54.0	10.4
2,423.40	-64.4	-53.5	10.9
2,423.45	-64.4	-54.0	10.4
2,423.50	-64.4	-53.5	10.9
2,423.55	-64.4	-53.5	10.9
2,423.60	-64.4	-54.0	10.4
2,423.65	-64.4	-54.0	10.4
2,423.70	-64.4	-53.5	10.9
2,423.75	-64.4	-53.5	10.9
2,423.80	-64.4	-53.5	10.9
2,423.85	-64.4	-54.0	10.4
2,423.90	-64.4	-54.0	10.4

Location Sensor Model LOS-4100, LAP-4200



Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,423.95	-64.4	-54.0	10.4
2,424.00	-64.4	-53.5	10.9
2,424.05	-64.4	-53.5	10.9
2,424.10	-64.4	-54.5	9.9
2,424.15	-64.4	-54.5	9.9
2,424.20	-64.4	-53.5	10.9
2,424.25	-64.4	-53.0	11.4
2,424.30	-64.4	-53.0	11.4
2,424.35	-64.4	-54.0	10.4
2,424.40	-64.4	-54.0	10.4
2,424.45	-64.4	-53.5	10.9
2,424.50	-64.4	-53.5	10.9
2,424.55	-64.4	-53.5	10.9
2,424.60	-64.4	-54.5	9.9
2,424.65	-64.4	-54.5	9.9
2,424.70	-64.4	-54.5	9.9
2,424.75	-64.4	-55.0	9.4
2,424.80	-64.4	-54.0	10.4
2,424.85	-64.4	-54.5	9.9
2,424.90	-64.4	-54.0	10.4
2,424.95	-64.4	-54.0	10.4
2,425.00	-64.4	-54.0	10.4
2,425.05	-64.4	-55.0	9.4
2,425.10	-64.4	-54.5	9.9
2,425.15	-64.4	-54.5	9.9
2,425.20	-64.4	-54.5	9.9
2,425.25	-64.4	-54.5	9.9
2,425.30	-64.4	-54.5	9.9
2,425.35	-64.4	-54.5	9.9
2,425.40	-64.4	-55.0	9.4
2,425.45	-64.4	-54.5	9.9
2,425.50	-64.4	-55.0	9.4
2,425.55	-64.4	-54.5	9.9
2,425.60	-64.4	-54.5	9.9
2,425.65	-64.4	-54.5	9.9
2,425.70	-64.4	-55.0	9.4
2,425.75	-64.4	-54.5	9.9
2,425.80	-64.4	-54.5	9.9
2,425.85	-64.4	-54.0	10.4
2,425.90	-64.4	-55.0	9.4
2,425.95	-64.4	-55.0	9.4

Location Sensor Model LOS-4100, LAP-4200



Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,426.00	-64.4	-54.5	9.9
2,426.05	-64.4	-54.5	9.9
2,426.10	-64.4	-54.5	9.9
2,426.15	-64.4	-54.5	9.9
2,426.20	-64.4	-54.0	10.4
2,426.25	-64.4	-54.0	10.4
2,426.30	-64.4	-54.5	9.9
2,426.35	-64.4	-54.0	10.4
2,426.40	-64.4	-55.0	9.4
2,426.45	-64.4	-54.5	9.9
2,426.50	-64.4	-55.0	9.4
2,426.55	-64.4	-54.0	10.4
2,426.60	-64.4	-54.5	9.9
2,426.65	-64.4	-55.0	9.4
2,426.70	-64.4	-54.0	10.4
2,426.75	-64.4	-54.5	9.9
2,426.80	-64.4	-54.5	9.9
2,426.85	-64.4	-54.0	10.4
2,426.90	-64.4	-55.0	9.4
2,426.95	-64.4	-54.5	9.9
2,427.00	-64.4	-54.0	10.4
2,427.05	-64.4	-54.0	10.4
2,427.10	-64.4	-54.0	10.4
2,427.15	-64.4	-54.0	10.4
2,427.20	-64.4	-54.5	9.9
2,427.25	-64.4	-54.5	9.9
2,427.30	-64.4	-54.5	9.9
2,427.35	-64.4	-55.0	9.4
2,427.40	-64.4	-55.5	8.9
2,427.45	-64.4	-55.5	8.9
2,427.50	-64.4	-56.5	7.9
2,427.55	-64.4	-56.5	7.9
2,427.60	-64.4	-55.0	9.4
2,427.65	-64.4	-54.0	10.4
2,427.70	-64.4	-53.5	10.9
2,427.75	-64.4	-53.5	10.9
2,427.80	-64.4	-54.0	10.4
2,427.85	-64.4	-54.0	10.4
2,427.90	-64.4	-54.5	9.9
2,427.95	-64.4	-55.0	9.4
2,428.00	-64.4	-54.0	10.4

Location Sensor Model LOS-4100, LAP-4200



Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,428.05	-64.4	-54.0	10.4
2,428.10	-64.4	-53.5	10.9
2,428.15	-64.4	-54.5	9.9
2,428.20	-64.4	-54.5	9.9
2,428.25	-64.4	-53.5	10.9
2,428.30	-64.4	-53.0	11.4
2,428.35	-64.4	-53.0	11.4
2,428.40	-64.4	-54.5	9.9
2,428.45	-64.4	-54.0	10.4
2,428.50	-64.4	-54.5	9.9
2,428.55	-64.4	-53.0	11.4
2,428.60	-64.4	-53.0	11.4
2,428.65	-64.4	-53.5	10.9
2,428.70	-64.4	-55.0	9.4
2,428.75	-64.4	-55.5	8.9
2,428.80	-64.4	-55.0	9.4
2,428.85	-64.4	-54.5	9.9
2,428.90	-64.4	-54.5	9.9
2,428.95	-64.4	-54.0	10.4
2,429.00	-64.4	-54.0	10.4
2,429.05	-64.4	-54.0	10.4
2,429.10	-64.4	-53.5	10.9
2,429.15	-64.4	-53.5	10.9
2,429.20	-64.4	-54.0	10.4
2,429.25	-64.4	-54.0	10.4
2,429.30	-64.4	-54.5	9.9
2,429.35	-64.4	-55.5	8.9
2,429.40	-64.4	-56.0	8.4
2,429.45	-64.4	-56.0	8.4
2,429.50	-64.4	-54.5	9.9
2,429.55	-64.4	-54.0	10.4
2,429.60	-64.4	-54.5	9.9
2,429.65	-64.4	-55.5	8.9
2,429.70	-64.4	-55.5	8.9
2,429.75	-64.4	-55.0	9.4
2,429.80	-64.4	-54.0	10.4
2,429.85	-64.4	-53.5	10.9
2,429.90	-64.4	-54.0	10.4
2,429.95	-64.4	-54.5	9.9
2,430.00	-64.4	-54.5	9.9
2,430.05	-64.4	-54.5	9.9

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Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,430.10	-64.4	-54.5	9.9
2,430.15	-64.4	-54.5	9.9
2,430.20	-64.4	-54.0	10.4
2,430.25	-64.4	-55.0	9.4
2,430.30	-64.4	-55.5	8.9
2,430.35	-64.4	-56.0	8.4
2,430.40	-64.4	-56.5	7.9
2,430.45	-64.4	-56.0	8.4
2,430.50	-64.4	-56.5	7.9
2,430.55	-64.4	-57.0	7.4
2,430.60	-64.4	-56.5	7.9
2,430.65	-64.4	-56.0	8.4
2,430.70	-64.4	-55.0	9.4
2,430.75	-64.4	-54.5	9.9
2,430.80	-64.4	-53.5	10.9
2,430.85	-64.4	-53.5	10.9
2,430.90	-64.4	-54.0	10.4
2,430.95	-64.4	-54.5	9.9
2,431.00	-64.4	-55.0	9.4
2,431.05	-64.4	-54.0	10.4
2,431.10	-64.4	-55.5	8.9
2,431.15	-64.4	-55.5	8.9
2,431.20	-64.4	-56.0	8.4
2,431.25	-64.4	-56.0	8.4
2,431.30	-64.4	-54.5	9.9
2,431.35	-64.4	-54.0	10.4
2,431.40	-64.4	-54.0	10.4
2,431.45	-64.4	-55.0	9.4
2,431.50	-64.4	-55.5	8.9
2,431.55	-64.4	-56.5	7.9
2,431.60	-64.4	-55.0	9.4
2,431.65	-64.4	-54.5	9.9
2,431.70	-64.4	-54.0	10.4
2,431.75	-64.4	-54.0	10.4
2,431.80	-64.4	-53.5	10.9
2,431.85	-64.4	-54.0	10.4
2,431.90	-64.4	-54.0	10.4
2,431.95	-64.4	-54.0	10.4
2,432.00	-64.4	-54.5	9.9
2,432.05	-64.4	-54.5	9.9
2,432.10	-64.4	-55.0	9.4



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Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,432.15	-64.4	-55.0	9.4
2,432.20	-64.4	-54.5	9.9
2,432.25	-64.4	-54.5	9.9
2,432.30	-64.4	-54.5	9.9
2,432.35	-64.4	-54.0	10.4
2,432.40	-64.4	-54.0	10.4
2,432.45	-64.4	-53.5	10.9
2,432.50	-64.4	-54.5	9.9
2,432.55	-64.4	-54.0	10.4
2,432.60	-64.4	-54.0	10.4
2,432.65	-64.4	-54.5	9.9
2,432.70	-64.4	-55.0	9.4
2,432.75	-64.4	-56.5	7.9
2,432.80	-64.4	-55.5	8.9
2,432.85	-64.4	-54.0	10.4
2,432.90	-64.4	-54.5	9.9
2,432.95	-64.4	-54.5	9.9
2,433.00	-64.4	-55.5	8.9
2,433.05	-64.4	-57.0	7.4
2,433.10	-64.4	-56.0	8.4
2,433.15	-64.4	-55.5	8.9
2,433.20	-64.4	-54.0	10.4
2,433.25	-64.4	-54.5	9.9
2,433.30	-64.4	-56.5	7.9
2,433.35	-64.4	-57.0	7.4
2,433.40	-64.4	-56.5	7.9
2,433.45	-64.4	-55.0	9.4
2,433.50	-64.4	-54.0	10.4
2,433.55	-64.4	-54.5	9.9
2,433.60	-64.4	-55.5	8.9
2,433.65	-64.4	-56.0	8.4
2,433.70	-64.4	-56.0	8.4
2,433.75	-64.4	-56.0	8.4
2,433.80	-64.4	-55.0	9.4
2,433.85	-64.4	-55.0	9.4
2,433.90	-64.4	-55.0	9.4
2,433.95	-64.4	-55.0	9.4
2,434.00	-64.4	-55.5	8.9
2,434.05	-64.4	-55.0	9.4
2,434.10	-64.4	-55.5	8.9
2,434.15	-64.4	-55.0	9.4

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Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,434.20	-64.4	-56.0	8.4
2,434.25	-64.4	-55.5	8.9
2,434.30	-64.4	-56.0	8.4
2,434.35	-64.4	-55.5	8.9
2,434.40	-64.4	-55.5	8.9
2,434.45	-64.4	-54.5	9.9
2,434.50	-64.4	-54.0	10.4
2,434.55	-64.4	-54.0	10.4
2,434.60	-64.4	-54.5	9.9
2,434.65	-64.4	-55.0	9.4
2,434.70	-64.4	-55.0	9.4
2,434.75	-64.4	-55.0	9.4
2,434.80	-64.4	-55.0	9.4
2,434.85	-64.4	-55.0	9.4
2,434.90	-64.4	-55.0	9.4
2,434.95	-64.4	-54.0	10.4
2,435.00	-64.4	-54.5	9.9
2,435.05	-64.4	-54.5	9.9
2,435.10	-64.4	-54.5	9.9
2,435.15	-64.4	-55.5	8.9
2,435.20	-64.4	-55.5	8.9
2,435.25	-64.4	-56.0	8.4
2,435.30	-64.4	-55.5	8.9
2,435.35	-64.4	-55.5	8.9
2,435.40	-64.4	-54.5	9.9
2,435.45	-64.4	-54.5	9.9
2,435.50	-64.4	-54.0	10.4
2,435.55	-64.4	-54.5	9.9
2,435.60	-64.4	-54.5	9.9
2,435.65	-64.4	-54.0	10.4
2,435.70	-64.4	-55.0	9.4
2,435.75	-64.4	-55.5	8.9
2,435.80	-64.4	-56.0	8.4
2,435.85	-64.4	-55.0	9.4
2,435.90	-64.4	-55.0	9.4
2,435.95	-64.4	-55.0	9.4
2,436.00	-64.4	-55.0	9.4
2,436.05	-64.4	-54.5	9.9
2,436.10	-64.4	-54.0	10.4
2,436.15	-64.4	-55.0	9.4
2,436.20	-64.4	-55.0	9.4

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Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,436.25	-64.4	-55.0	9.4
2,436.30	-64.4	-55.5	8.9
2,436.35	-64.4	-55.0	9.4
2,436.40	-64.4	-55.5	8.9
2,436.45	-64.4	-55.0	9.4
2,436.50	-64.4	-55.5	8.9
2,436.55	-64.4	-55.5	8.9
2,436.60	-64.4	-55.0	9.4
2,436.65	-64.4	-54.5	9.9
2,436.70	-64.4	-55.0	9.4
2,436.75	-64.4	-56.0	8.4
2,436.80	-64.4	-56.5	7.9
2,436.85	-64.4	-56.0	8.4
2,436.90	-64.4	-55.0	9.4
2,436.95	-64.4	-55.0	9.4
2,437.00	-64.4	-55.5	8.9
2,437.05	-64.4	-56.0	8.4
2,437.10	-64.4	-56.5	7.9
2,437.15	-64.4	-56.5	7.9
2,437.20	-64.4	-55.5	8.9
2,437.25	-64.4	-56.0	8.4
2,437.30	-64.4	-56.5	7.9
2,437.35	-64.4	-58.5	5.9
2,437.40	-64.4	-58.0	6.4
2,437.45	-64.4	-56.5	7.9
2,437.50	-64.4	-54.5	9.9
2,437.55	-64.4	-54.5	9.9
2,437.60	-64.4	-56.0	8.4
2,437.65	-64.4	-56.0	8.4
2,437.70	-64.4	-57.5	6.9
2,437.75	-64.4	-56.5	7.9
2,437.80	-64.4	-56.0	8.4
2,437.85	-64.4	-55.5	8.9
2,437.90	-64.4	-55.5	8.9
2,437.95	-64.4	-55.0	9.4
2,438.00	-64.4	-56.0	8.4
2,438.05	-64.4	-55.0	9.4
2,438.10	-64.4	-55.0	9.4
2,438.15	-64.4	-54.5	9.9
2,438.20	-64.4	-55.0	9.4
2,438.25	-64.4	-55.5	8.9

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Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,438.30	-64.4	-56.5	7.9
2,438.35	-64.4	-56.0	8.4
2,438.40	-64.4	-56.5	7.9
2,438.45	-64.4	-55.5	8.9
2,438.50	-64.4	-55.5	8.9
2,438.55	-64.4	-55.5	8.9
2,438.60	-64.4	-56.0	8.4
2,438.65	-64.4	-55.5	8.9
2,438.70	-64.4	-55.5	8.9
2,438.75	-64.4	-56.0	8.4
2,438.80	-64.4	-56.0	8.4
2,438.85	-64.4	-56.5	7.9
2,438.90	-64.4	-57.5	6.9
2,438.95	-64.4	-57.0	7.4
2,439.00	-64.4	-56.5	7.9
2,439.05	-64.4	-55.5	8.9
2,439.10	-64.4	-55.5	8.9
2,439.15	-64.4	-57.0	7.4
2,439.20	-64.4	-56.5	7.9
2,439.25	-64.4	-56.0	8.4
2,439.30	-64.4	-55.5	8.9
2,439.35	-64.4	-55.5	8.9
2,439.40	-64.4	-54.5	9.9
2,439.45	-64.4	-56.0	8.4
2,439.50	-64.4	-56.0	8.4
2,439.55	-64.4	-56.5	7.9
2,439.60	-64.4	-55.5	8.9
2,439.65	-64.4	-55.5	8.9
2,439.70	-64.4	-56.0	8.4
2,439.75	-64.4	-56.5	7.9
2,439.80	-64.4	-58.0	6.4
2,439.85	-64.4	-57.5	6.9
2,439.90	-64.4	-56.5	7.9
2,439.95	-64.4	-55.5	8.9
2,440.00	-64.4	-55.5	8.9
2,440.05	-64.4	-57.0	7.4
2,440.10	-64.4	-57.5	6.9
2,440.15	-64.4	-58.5	5.9
2,440.20	-64.4	-57.5	6.9
2,440.25	-64.4	-55.5	8.9
2,440.30	-64.4	-56.5	7.9

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Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,440.35	-64.4	-56.5	7.9
2,440.40	-64.4	-57.5	6.9
2,440.45	-64.4	-56.0	8.4
2,440.50	-64.4	-55.0	9.4
2,440.55	-64.4	-55.0	9.4
2,440.60	-64.4	-55.0	9.4
2,440.65	-64.4	-55.0	9.4
2,440.70	-64.4	-55.5	8.9
2,440.75	-64.4	-55.0	9.4
2,440.80	-64.4	-55.5	8.9
2,440.85	-64.4	-57.0	7.4
2,440.90	-64.4	-55.5	8.9
2,440.95	-64.4	-56.0	8.4
2,441.00	-64.4	-57.5	6.9
2,441.05	-64.4	-57.5	6.9
2,441.10	-64.4	-56.5	7.9
2,441.15	-64.4	-57.0	7.4
2,441.20	-64.4	-56.0	8.4
2,441.25	-64.4	-57.0	7.4
2,441.30	-64.4	-58.0	6.4
2,441.35	-64.4	-58.0	6.4
2,441.40	-64.4	-57.5	6.9
2,441.45	-64.4	-57.5	6.9
2,441.50	-64.4	-57.0	7.4
2,441.55	-64.4	-58.0	6.4
2,441.60	-64.4	-59.0	5.4
2,441.65	-64.4	-61.0	3.4
2,441.70	-64.4	-58.0	6.4
2,441.75	-64.4	-58.0	6.4
2,441.80	-64.4	-57.0	7.4
2,441.85	-64.4	-59.5	4.9
2,441.90	-64.4	-57.5	6.9
2,441.95	-64.4	-59.5	4.9
2,442.00	-64.4	-57.0	7.4
2,442.05	-64.4	-57.5	6.9
2,442.10	-64.4	-58.0	6.4
2,442.15	-64.4	-57.5	6.9
2,442.20	-64.4	-59.0	5.4
2,442.25	-64.4	-59.5	4.9
2,442.30	-64.4	-59.0	5.4
2,442.35	-64.4	-57.0	7.4

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Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,442.40	-64.4	-56.5	7.9
2,442.45	-64.4	-57.0	7.4
2,442.50	-64.4	-56.0	8.4
2,442.55	-64.4	-56.0	8.4
2,442.60	-64.4	-56.0	8.4
2,442.65	-64.4	-55.5	8.9
2,442.70	-64.4	-55.0	9.4
2,442.75	-64.4	-55.5	8.9
2,442.80	-64.4	-56.0	8.4
2,442.85	-64.4	-56.5	7.9
2,442.90	-64.4	-55.5	8.9
2,442.95	-64.4	-56.0	8.4
2,443.00	-64.4	-55.5	8.9
2,443.05	-64.4	-55.5	8.9
2,443.10	-64.4	-55.5	8.9
2,443.15	-64.4	-56.5	7.9
2,443.20	-64.4	-59.5	4.9
2,443.25	-64.4	-57.0	7.4
2,443.30	-64.4	-56.0	8.4
2,443.35	-64.4	-55.5	8.9
2,443.40	-64.4	-55.0	9.4
2,443.45	-64.4	-56.5	7.9
2,443.50	-64.4	-57.5	6.9
2,443.55	-64.4	-57.5	6.9
2,443.60	-64.4	-57.0	7.4
2,443.65	-64.4	-56.0	8.4
2,443.70	-64.4	-57.0	7.4
2,443.75	-64.4	-57.0	7.4
2,443.80	-64.4	-59.0	5.4
2,443.85	-64.4	-57.5	6.9
2,443.90	-64.4	-57.5	6.9
2,443.95	-64.4	-56.5	7.9
2,444.00	-64.4	-57.0	7.4
2,444.05	-64.4	-57.0	7.4
2,444.10	-64.4	-57.5	6.9
2,444.15	-64.4	-57.5	6.9
2,444.20	-64.4	-57.0	7.4
2,444.25	-64.4	-57.0	7.4
2,444.30	-64.4	-55.5	8.9
2,444.35	-64.4	-56.0	8.4
2,444.40	-64.4	-56.5	7.9

Location Sensor Model LOS-4100, LAP-4200



Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,444.45	-64.4	-56.0	8.4
2,444.50	-64.4	-55.0	9.4
2,444.55	-64.4	-56.0	8.4
2,444.60	-64.4	-55.5	8.9
2,444.65	-64.4	-56.0	8.4
2,444.70	-64.4	-55.0	9.4
2,444.75	-64.4	-55.5	8.9
2,444.80	-64.4	-56.0	8.4
2,444.85	-64.4	-56.5	7.9
2,444.90	-64.4	-55.5	8.9
2,444.95	-64.4	-56.5	7.9
2,445.00	-64.4	-56.5	7.9
2,445.05	-64.4	-56.5	7.9
2,445.10	-64.4	-56.5	7.9
2,445.15	-64.4	-56.5	7.9
2,445.20	-64.4	-56.0	8.4
2,445.25	-64.4	-56.0	8.4
2,445.30	-64.4	-56.0	8.4
2,445.35	-64.4	-55.5	8.9
2,445.40	-64.4	-55.5	8.9
2,445.45	-64.4	-55.5	8.9
2,445.50	-64.4	-56.0	8.4
2,445.55	-64.4	-57.0	7.4
2,445.60	-64.4	-58.0	6.4
2,445.65	-64.4	-58.5	5.9
2,445.70	-64.4	-59.5	4.9
2,445.75	-64.4	-58.0	6.4
2,445.80	-64.4	-56.5	7.9
2,445.85	-64.4	-56.5	7.9
2,445.90	-64.4	-57.5	6.9
2,445.95	-64.4	-57.5	6.9
2,446.00	-64.4	-56.5	7.9
2,446.05	-64.4	-57.5	6.9
2,446.10	-64.4	-56.5	7.9
2,446.15	-64.4	-57.5	6.9
2,446.20	-64.4	-57.5	6.9
2,446.25	-64.4	-58.0	6.4
2,446.30	-64.4	-57.5	6.9
2,446.35	-64.4	-57.0	7.4
2,446.40	-64.4	-56.5	7.9
2,446.45	-64.4	-56.0	8.4

Location Sensor Model LOS-4100, LAP-4200



Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,446.50	-64.4	-55.5	8.9
2,446.55	-64.4	-56.0	8.4
2,446.60	-64.4	-57.5	6.9
2,446.65	-64.4	-57.5	6.9
2,446.70	-64.4	-57.0	7.4
2,446.75	-64.4	-56.0	8.4
2,446.80	-64.4	-56.0	8.4
2,446.85	-64.4	-56.0	8.4
2,446.90	-64.4	-57.0	7.4
2,446.95	-64.4	-56.5	7.9
2,447.00	-64.4	-56.5	7.9
2,447.05	-64.4	-56.5	7.9
2,447.10	-64.4	-57.0	7.4
2,447.15	-64.4	-57.0	7.4
2,447.20	-64.4	-58.0	6.4
2,447.25	-64.4	-57.0	7.4
2,447.30	-64.4	-56.5	7.9
2,447.35	-64.4	-57.0	7.4
2,447.40	-64.4	-57.0	7.4
2,447.45	-64.4	-57.0	7.4
2,447.50	-64.4	-57.5	6.9
2,447.55	-64.4	-57.0	7.4
2,447.60	-64.4	-57.0	7.4
2,447.65	-64.4	-56.0	8.4
2,447.70	-64.4	-56.5	7.9
2,447.75	-64.4	-56.0	8.4
2,447.80	-64.4	-56.0	8.4
2,447.85	-64.4	-56.0	8.4
2,447.90	-64.4	-56.0	8.4
2,447.95	-64.4	-56.0	8.4
2,448.00	-64.4	-55.5	8.9
2,448.05	-64.4	-58.0	6.4
2,448.10	-64.4	-59.0	5.4
2,448.15	-64.4	-59.5	4.9
2,448.20	-64.4	-58.0	6.4
2,448.25	-64.4	-56.5	7.9
2,448.30	-64.4	-55.5	8.9
2,448.35	-64.4	-56.0	8.4
2,448.40	-64.4	-57.5	6.9
2,448.45	-64.4	-57.0	7.4
2,448.50	-64.4	-56.0	8.4



Location Sensor Model LOS-4100, LAP-4200



Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,448.55	-64.4	-55.5	8.9
2,448.60	-64.4	-55.5	8.9
2,448.65	-64.4	-56.5	7.9
2,448.70	-64.4	-57.5	6.9
2,448.75	-64.4	-57.5	6.9
2,448.80	-64.4	-57.5	6.9
2,448.85	-64.4	-57.5	6.9
2,448.90	-64.4	-57.0	7.4
2,448.95	-64.4	-57.0	7.4
2,449.00	-64.4	-56.5	7.9
2,449.05	-64.4	-57.0	7.4
2,449.10	-64.4	-57.0	7.4
2,449.15	-64.4	-57.0	7.4
2,449.20	-64.4	-56.5	7.9
2,449.25	-64.4	-56.5	7.9
2,449.30	-64.4	-58.0	6.4
2,449.35	-64.4	-59.0	5.4
2,449.40	-64.4	-58.5	5.9
2,449.45	-64.4	-57.5	6.9
2,449.50	-64.4	-56.5	7.9
2,449.55	-64.4	-56.5	7.9
2,449.60	-64.4	-56.5	7.9
2,449.65	-64.4	-56.5	7.9
2,449.70	-64.4	-57.5	6.9
2,449.75	-64.4	-56.5	7.9
2,449.80	-64.4	-55.5	8.9
2,449.85	-64.4	-56.0	8.4
2,449.90	-64.4	-57.5	6.9
2,449.95	-64.4	-58.0	6.4
2,450.00	-64.4	-58.0	6.4
2,450.05	-64.4	-57.0	7.4
2,450.10	-64.4	-57.0	7.4
2,450.15	-64.4	-56.0	8.4
2,450.20	-64.4	-57.0	7.4
2,450.25	-64.4	-57.0	7.4
2,450.30	-64.4	-57.0	7.4
2,450.35	-64.4	-57.0	7.4
2,450.40	-64.4	-56.0	8.4
2,450.45	-64.4	-56.5	7.9
2,450.50	-64.4	-57.0	7.4
2,450.55	-64.4	-57.5	6.9

Location Sensor Model LOS-4100, LAP-4200



Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,450.60	-64.4	-57.0	7.4
2,450.65	-64.4	-57.5	6.9
2,450.70	-64.4	-56.5	7.9
2,450.75	-64.4	-56.5	7.9
2,450.80	-64.4	-56.5	7.9
2,450.85	-64.4	-57.0	7.4
2,450.90	-64.4	-58.0	6.4
2,450.95	-64.4	-57.0	7.4
2,451.00	-64.4	-57.0	7.4
2,451.05	-64.4	-57.5	6.9
2,451.10	-64.4	-57.5	6.9
2,451.15	-64.4	-57.0	7.4
2,451.20	-64.4	-57.5	6.9
2,451.25	-64.4	-57.0	7.4
2,451.30	-64.4	-57.0	7.4
2,451.35	-64.4	-56.5	7.9
2,451.40	-64.4	-57.0	7.4
2,451.45	-64.4	-58.0	6.4
2,451.50	-64.4	-58.5	5.9
2,451.55	-64.4	-58.0	6.4
2,451.60	-64.4	-57.5	6.9
2,451.65	-64.4	-57.0	7.4
2,451.70	-64.4	-57.5	6.9
2,451.75	-64.4	-57.5	6.9
2,451.80	-64.4	-57.5	6.9
2,451.85	-64.4	-57.5	6.9
2,451.90	-64.4	-57.0	7.4
2,451.95	-64.4	-57.5	6.9
2,452.00	-64.4	-58.0	6.4
2,452.05	-64.4	-58.0	6.4
2,452.10	-64.4	-59.5	4.9
2,452.15	-64.4	-58.5	5.9
2,452.20	-64.4	-57.5	6.9
2,452.25	-64.4	-56.5	7.9
2,452.30	-64.4	-57.5	6.9
2,452.35	-64.4	-57.0	7.4
2,452.40	-64.4	-57.5	6.9
2,452.45	-64.4	-57.0	7.4
2,452.50	-64.4	-56.5	7.9
2,452.55	-64.4	-57.0	7.4
2,452.60	-64.4	-57.0	7.4

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Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,452.65	-64.4	-57.0	7.4
2,452.70	-64.4	-57.5	6.9
2,452.75	-64.4	-57.0	7.4
2,452.80	-64.4	-57.0	7.4
2,452.85	-64.4	-56.0	8.4
2,452.90	-64.4	-57.0	7.4
2,452.95	-64.4	-56.5	7.9
2,453.00	-64.4	-57.5	6.9
2,453.05	-64.4	-57.5	6.9
2,453.10	-64.4	-57.0	7.4
2,453.15	-64.4	-56.0	8.4
2,453.20	-64.4	-56.5	7.9
2,453.25	-64.4	-56.0	8.4
2,453.30	-64.4	-57.0	7.4
2,453.35	-64.4	-57.0	7.4
2,453.40	-64.4	-57.5	6.9
2,453.45	-64.4	-57.0	7.4
2,453.50	-64.4	-57.5	6.9
2,453.55	-64.4	-57.0	7.4
2,453.60	-64.4	-57.0	7.4
2,453.65	-64.4	-58.0	6.4
2,453.70	-64.4	-57.5	6.9
2,453.75	-64.4	-56.5	7.9
2,453.80	-64.4	-57.0	7.4
2,453.85	-64.4	-56.5	7.9
2,453.90	-64.4	-56.5	7.9
2,453.95	-64.4	-57.0	7.4
2,454.00	-64.4	-56.5	7.9
2,454.05	-64.4	-57.0	7.4
2,454.10	-64.4	-56.5	7.9
2,454.15	-64.4	-57.0	7.4
2,454.20	-64.4	-57.5	6.9
2,454.25	-64.4	-57.5	6.9
2,454.30	-64.4	-57.5	6.9
2,454.35	-64.4	-57.5	6.9
2,454.40	-64.4	-57.5	6.9
2,454.45	-64.4	-57.0	7.4
2,454.50	-64.4	-57.5	6.9
2,454.55	-64.4	-57.5	6.9
2,454.60	-64.4	-57.5	6.9
2,454.65	-64.4	-58.0	6.4

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Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,454.70	-64.4	-57.5	6.9
2,454.75	-64.4	-56.5	7.9
2,454.80	-64.4	-57.0	7.4
2,454.85	-64.4	-57.0	7.4
2,454.90	-64.4	-58.0	6.4
2,454.95	-64.4	-58.0	6.4
2,455.00	-64.4	-57.5	6.9
2,455.05	-64.4	-57.0	7.4
2,455.10	-64.4	-57.5	6.9
2,455.15	-64.4	-57.5	6.9
2,455.20	-64.4	-58.0	6.4
2,455.25	-64.4	-57.0	7.4
2,455.30	-64.4	-57.5	6.9
2,455.35	-64.4	-57.5	6.9
2,455.40	-64.4	-57.0	7.4
2,455.45	-64.4	-57.0	7.4
2,455.50	-64.4	-57.5	6.9
2,455.55	-64.4	-57.0	7.4
2,455.60	-64.4	-56.5	7.9
2,455.65	-64.4	-57.0	7.4
2,455.70	-64.4	-56.5	7.9
2,455.75	-64.4	-57.5	6.9
2,455.80	-64.4	-57.5	6.9
2,455.85	-64.4	-57.0	7.4
2,455.90	-64.4	-57.0	7.4
2,455.95	-64.4	-57.5	6.9
2,456.00	-64.4	-57.0	7.4
2,456.05	-64.4	-58.5	5.9
2,456.10	-64.4	-58.0	6.4
2,456.15	-64.4	-58.0	6.4
2,456.20	-64.4	-57.0	7.4
2,456.25	-64.4	-56.5	7.9
2,456.30	-64.4	-56.0	8.4
2,456.35	-64.4	-57.0	7.4
2,456.40	-64.4	-57.5	6.9
2,456.45	-64.4	-57.0	7.4
2,456.50	-64.4	-57.0	7.4
2,456.55	-64.4	-57.5	6.9
2,456.60	-64.4	-58.5	5.9
2,456.65	-64.4	-59.0	5.4
2,456.70	-64.4	-58.5	5.9

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Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,456.75	-64.4	-58.5	5.9
2,456.80	-64.4	-58.0	6.4
2,456.85	-64.4	-58.0	6.4
2,456.90	-64.4	-56.5	7.9
2,456.95	-64.4	-57.0	7.4
2,457.00	-64.4	-57.5	6.9
2,457.05	-64.4	-57.0	7.4
2,457.10	-64.4	-56.5	7.9
2,457.15	-64.4	-57.0	7.4
2,457.20	-64.4	-57.5	6.9
2,457.25	-64.4	-57.0	7.4
2,457.30	-64.4	-57.5	6.9
2,457.35	-64.4	-57.5	6.9
2,457.40	-64.4	-57.0	7.4
2,457.45	-64.4	-57.5	6.9
2,457.50	-64.4	-57.0	7.4
2,457.55	-64.4	-57.0	7.4
2,457.60	-64.4	-58.0	6.4
2,457.65	-64.4	-57.5	6.9
2,457.70	-64.4	-57.0	7.4
2,457.75	-64.4	-57.0	7.4
2,457.80	-64.4	-56.5	7.9
2,457.85	-64.4	-56.0	8.4
2,457.90	-64.4	-58.5	5.9
2,457.95	-64.4	-58.0	6.4
2,458.00	-64.4	-58.0	6.4
2,458.05	-64.4	-57.5	6.9
2,458.10	-64.4	-58.0	6.4
2,458.15	-64.4	-59.0	5.4
2,458.20	-64.4	-58.0	6.4
2,458.25	-64.4	-57.5	6.9
2,458.30	-64.4	-58.5	5.9
2,458.35	-64.4	-57.0	7.4
2,458.40	-64.4	-58.0	6.4
2,458.45	-64.4	-58.5	5.9
2,458.50	-64.4	-57.0	7.4
2,458.55	-64.4	-57.5	6.9
2,458.60	-64.4	-58.5	5.9
2,458.65	-64.4	-57.0	7.4
2,458.70	-64.4	-58.0	6.4
2,458.75	-64.4	-58.0	6.4

Location Sensor Model LOS-4100, LAP-4200



Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,458.80	-64.4	-58.5	5.9
2,458.85	-64.4	-57.0	7.4
2,458.90	-64.4	-58.0	6.4
2,458.95	-64.4	-59.0	5.4
2,459.00	-64.4	-58.0	6.4
2,459.05	-64.4	-58.0	6.4
2,459.10	-64.4	-59.5	4.9
2,459.15	-64.4	-59.5	4.9
2,459.20	-64.4	-58.5	5.9
2,459.25	-64.4	-59.0	5.4
2,459.30	-64.4	-58.5	5.9
2,459.35	-64.4	-58.0	6.4
2,459.40	-64.4	-56.5	7.9
2,459.45	-64.4	-57.0	7.4
2,459.50	-64.4	-57.5	6.9
2,459.55	-64.4	-57.5	6.9
2,459.60	-64.4	-58.0	6.4
2,459.65	-64.4	-57.5	6.9
2,459.70	-64.4	-57.5	6.9
2,459.75	-64.4	-57.5	6.9
2,459.80	-64.4	-57.0	7.4
2,459.85	-64.4	-57.0	7.4
2,459.90	-64.4	-56.5	7.9
2,459.95	-64.4	-57.0	7.4
2,460.00	-64.4	-57.0	7.4
2,460.05	-64.4	-57.5	6.9
2,460.10	-64.4	-57.5	6.9
2,460.15	-64.4	-57.0	7.4
2,460.20	-64.4	-57.5	6.9
2,460.25	-64.4	-57.5	6.9
2,460.30	-64.4	-57.5	6.9
2,460.35	-64.4	-57.0	7.4
2,460.40	-64.4	-57.5	6.9
2,460.45	-64.4	-57.0	7.4
2,460.50	-64.4	-57.5	6.9
2,460.55	-64.4	-57.0	7.4
2,460.60	-64.4	-57.0	7.4
2,460.65	-64.4	-57.5	6.9
2,460.70	-64.4	-57.0	7.4
2,460.75	-64.4	-57.0	7.4
2,460.80	-64.4	-57.5	6.9

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Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,460.85	-64.4	-58.0	6.4
2,460.90	-64.4	-57.0	7.4
2,460.95	-64.4	-57.0	7.4
2,461.00	-64.4	-57.0	7.4
2,461.05	-64.4	-57.0	7.4
2,461.10	-64.4	-57.5	6.9
2,461.15	-64.4	-57.5	6.9
2,461.20	-64.4	-56.5	7.9
2,461.25	-64.4	-56.5	7.9
2,461.30	-64.4	-57.0	7.4
2,461.35	-64.4	-57.0	7.4
2,461.40	-64.4	-56.0	8.4
2,461.45	-64.4	-55.0	9.4
2,461.50	-64.4	-56.5	7.9
2,461.55	-64.4	-57.5	6.9
2,461.60	-64.4	-57.5	6.9
2,461.65	-64.4	-58.0	6.4
2,461.70	-64.4	-57.5	6.9
2,461.75	-64.4	-56.5	7.9
2,461.80	-64.4	-57.0	7.4
2,461.85	-64.4	-56.5	7.9
2,461.90	-64.4	-57.0	7.4
2,461.95	-64.4	-56.5	7.9
2,462.00	-64.4	-56.5	7.9
2,462.05	-64.4	-57.0	7.4
2,462.10	-64.4	-57.0	7.4
2,462.15	-64.4	-57.0	7.4
2,462.20	-64.4	-57.0	7.4
2,462.25	-64.4	-57.0	7.4
2,462.30	-64.4	-57.0	7.4
2,462.35	-64.4	-57.0	7.4
2,462.40	-64.4	-57.0	7.4
2,462.45	-64.4	-57.5	6.9
2,462.50	-64.4	-57.5	6.9
2,462.55	-64.4	-56.5	7.9
2,462.60	-64.4	-57.5	6.9
2,462.65	-64.4	-57.5	6.9
2,462.70	-64.4	-57.0	7.4
2,462.75	-64.4	-56.5	7.9
2,462.80	-64.4	-57.0	7.4
2,462.85	-64.4	-56.5	7.9

Location Sensor Model LOS-4100, LAP-4200



Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,462.90	-64.4	-57.0	7.4
2,462.95	-64.4	-57.0	7.4
2,463.00	-64.4	-56.5	7.9
2,463.05	-64.4	-57.0	7.4
2,463.10	-64.4	-57.0	7.4
2,463.15	-64.4	-57.5	6.9
2,463.20	-64.4	-57.0	7.4
2,463.25	-64.4	-57.0	7.4
2,463.30	-64.4	-56.5	7.9
2,463.35	-64.4	-56.5	7.9
2,463.40	-64.4	-57.5	6.9
2,463.45	-64.4	-57.5	6.9
2,463.50	-64.4	-57.0	7.4
2,463.55	-64.4	-57.5	6.9
2,463.60	-64.4	-56.5	7.9
2,463.65	-64.4	-57.0	7.4
2,463.70	-64.4	-56.5	7.9
2,463.75	-64.4	-57.0	7.4
2,463.80	-64.4	-57.0	7.4
2,463.85	-64.4	-56.5	7.9
2,463.90	-64.4	-57.0	7.4
2,463.95	-64.4	-56.5	7.9
2,464.00	-64.4	-57.0	7.4
2,464.05	-64.4	-57.0	7.4
2,464.10	-64.4	-57.0	7.4
2,464.15	-64.4	-57.0	7.4
2,464.20	-64.4	-57.5	6.9
2,464.25	-64.4	-57.5	6.9
2,464.30	-64.4	-57.0	7.4
2,464.35	-64.4	-56.5	7.9
2,464.40	-64.4	-56.5	7.9
2,464.45	-64.4	-57.0	7.4
2,464.50	-64.4	-57.0	7.4
2,464.55	-64.4	-56.5	7.9
2,464.60	-64.4	-57.0	7.4
2,464.65	-64.4	-56.5	7.9
2,464.70	-64.4	-57.0	7.4
2,464.75	-64.4	-57.5	6.9
2,464.80	-64.4	-57.0	7.4
2,464.85	-64.4	-56.5	7.9
2,464.90	-64.4	-57.0	7.4



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Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,464.95	-64.4	-57.0	7.4
2,465.00	-64.4	-57.0	7.4
2,465.05	-64.4	-56.5	7.9
2,465.10	-64.4	-57.0	7.4
2,465.15	-64.4	-57.0	7.4
2,465.20	-64.4	-56.5	7.9
2,465.25	-64.4	-56.5	7.9
2,465.30	-64.4	-56.5	7.9
2,465.35	-64.4	-57.0	7.4
2,465.40	-64.4	-56.5	7.9
2,465.45	-64.4	-56.5	7.9
2,465.50	-64.4	-56.5	7.9
2,465.55	-64.4	-56.5	7.9
2,465.60	-64.4	-56.5	7.9
2,465.65	-64.4	-56.5	7.9
2,465.70	-64.4	-56.5	7.9
2,465.75	-64.4	-56.5	7.9
2,465.80	-64.4	-57.0	7.4
2,465.85	-64.4	-56.5	7.9
2,465.90	-64.4	-56.5	7.9
2,465.95	-64.4	-56.0	8.4
2,466.00	-64.4	-57.0	7.4
2,466.05	-64.4	-56.5	7.9
2,466.10	-64.4	-57.0	7.4
2,466.15	-64.4	-56.0	8.4
2,466.20	-64.4	-57.0	7.4
2,466.25	-64.4	-56.5	7.9
2,466.30	-64.4	-56.5	7.9
2,466.35	-64.4	-56.0	8.4
2,466.40	-64.4	-56.0	8.4
2,466.45	-64.4	-56.5	7.9
2,466.50	-64.4	-57.0	7.4
2,466.55	-64.4	-57.0	7.4
2,466.60	-64.4	-56.0	8.4
2,466.65	-64.4	-56.5	7.9
2,466.70	-64.4	-56.5	7.9
2,466.75	-64.4	-56.5	7.9
2,466.80	-64.4	-56.5	7.9
2,466.85	-64.4	-56.5	7.9
2,466.90	-64.4	-56.5	7.9
2,466.95	-64.4	-56.0	8.4

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Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,467.00	-64.4	-56.0	8.4
2,467.05	-64.4	-55.5	8.9
2,467.10	-64.4	-56.0	8.4
2,467.15	-64.4	-56.0	8.4
2,467.20	-64.4	-55.5	8.9
2,467.25	-64.4	-56.0	8.4
2,467.30	-64.4	-56.0	8.4
2,467.35	-64.4	-56.5	7.9
2,467.40	-64.4	-55.5	8.9
2,467.45	-64.4	-56.0	8.4
2,467.50	-64.4	-56.5	7.9
2,467.55	-64.4	-55.5	8.9
2,467.60	-64.4	-56.0	8.4
2,467.65	-64.4	-55.5	8.9
2,467.70	-64.4	-56.0	8.4
2,467.75	-64.4	-56.0	8.4
2,467.80	-64.4	-56.0	8.4
2,467.85	-64.4	-56.5	7.9
2,467.90	-64.4	-56.0	8.4
2,467.95	-64.4	-55.5	8.9
2,468.00	-64.4	-56.0	8.4
2,468.05	-64.4	-55.5	8.9
2,468.10	-64.4	-55.5	8.9
2,468.15	-64.4	-56.5	7.9
2,468.20	-64.4	-56.0	8.4
2,468.25	-64.4	-55.5	8.9
2,468.30	-64.4	-56.5	7.9
2,468.35	-64.4	-56.5	7.9
2,468.40	-64.4	-56.0	8.4
2,468.45	-64.4	-56.0	8.4
2,468.50	-64.4	-55.5	8.9
2,468.55	-64.4	-56.0	8.4
2,468.60	-64.4	-56.0	8.4
2,468.65	-64.4	-56.0	8.4
2,468.70	-64.4	-55.5	8.9
2,468.75	-64.4	-55.5	8.9
2,468.80	-64.4	-55.5	8.9
2,468.85	-64.4	-56.5	7.9
2,468.90	-64.4	-56.0	8.4
2,468.95	-64.4	-56.0	8.4
2,469.00	-64.4	-55.5	8.9

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Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,469.05	-64.4	-56.0	8.4
2,469.10	-64.4	-56.0	8.4
2,469.15	-64.4	-56.0	8.4
2,469.20	-64.4	-56.0	8.4
2,469.25	-64.4	-55.5	8.9
2,469.30	-64.4	-55.5	8.9
2,469.35	-64.4	-56.5	7.9
2,469.40	-64.4	-55.5	8.9
2,469.45	-64.4	-55.5	8.9
2,469.50	-64.4	-55.5	8.9
2,469.55	-64.4	-56.0	8.4
2,469.60	-64.4	-56.0	8.4
2,469.65	-64.4	-55.0	9.4
2,469.70	-64.4	-56.0	8.4
2,469.75	-64.4	-55.5	8.9
2,469.80	-64.4	-55.5	8.9
2,469.85	-64.4	-55.5	8.9
2,469.90	-64.4	-55.5	8.9
2,469.95	-64.4	-55.5	8.9
2,470.00	-64.4	-55.5	8.9
2,470.05	-64.4	-55.0	9.4
2,470.10	-64.4	-55.0	9.4
2,470.15	-64.4	-55.5	8.9
2,470.20	-64.4	-54.5	9.9
2,470.25	-64.4	-54.5	9.9
2,470.30	-64.4	-54.5	9.9
2,470.35	-64.4	-55.5	8.9
2,470.40	-64.4	-54.5	9.9
2,470.45	-64.4	-55.0	9.4
2,470.50	-64.4	-55.0	9.4
2,470.55	-64.4	-55.0	9.4
2,470.60	-64.4	-55.0	9.4
2,470.65	-64.4	-55.0	9.4
2,470.70	-64.4	-55.0	9.4
2,470.75	-64.4	-55.0	9.4
2,470.80	-64.4	-55.0	9.4
2,470.85	-64.4	-55.0	9.4
2,470.90	-64.4	-54.0	10.4
2,470.95	-64.4	-55.0	9.4
2,471.00	-64.4	-54.0	10.4
2,471.05	-64.4	-54.5	9.9

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Frequency (MHz)	Signal Power (dBm)	Jammer Power (dBm)	Jammer/ Signal (dB)
2,471.10	-64.4	-54.5	9.9
2,471.15	-64.4	-54.0	10.4
2,471.20	-64.4	-54.5	9.9
2,471.25	-64.4	-55.0	9.4
2,471.30	-64.4	-54.5	9.9
2,471.35	-64.4	-54.0	10.4
2,471.40	-64.4	-54.0	10.4
2,471.45	-64.4	-54.5	9.9
2,471.50	-64.4	-54.5	9.9
2,471.55	-64.4	-54.0	10.4
2,471.60	-64.4	-54.0	10.4
2,471.65	-64.4	-54.0	10.4
2,471.70	-64.4	-53.5	10.9
2,471.75	-64.4	-53.5	10.9
2,471.80	-64.4	-53.5	10.9
2,471.85	-64.4	-53.0	11.4
2,471.90	-64.4	-54.0	10.4
2,471.95	-64.4	-54.0	10.4
2,472.00	-64.4	-53.5	10.9
2,472.05	-64.4	-53.0	11.4
2,472.10	-64.4	-53.0	11.4
2,472.15	-64.4	-53.5	10.9
2,472.20	-64.4	-53.0	11.4