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**Re:** Explanation Letter 2411      **Number of Pages including this page:** 2

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Dr. Chernomordik:

Attached is the explanation of PG data on model WarpLink2411.

For your reference.

Regards

*Bob Lee*

Bob Lee 010216#

Re.5:

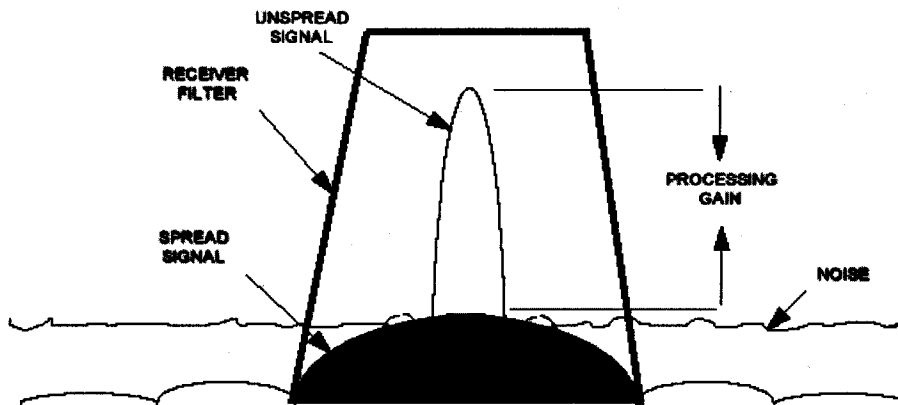
The products, FCC ID:NKRWARPLINKP & NKRWARPLINKA, are two DSSS (Direct Sequence Spread Spectrum) transceiver system implemented with Intersil's chip set. For the PG (Processing Gain) data, the following paragraph shows the evidence of identity to the reference one.

The PG of the NKRWARPLINKP is identical to that of FCC ID:OSZ3163B1, from the two aspects, transmitter aspect and receiver aspect.

For the transmitter aspect, the spread spectrum scheme is implement with the IC HFA3861A, Direct Sequence Spread Spectrum Processor.[1] One of the major function of this IC is to multiply the serial data with PN (Pseudo Random) sequence, which, as a consequence, spreading the frequency spectrum. This spread spectrum signals are then modulated to IF band and filter out by channel filter. Then it is upconverted to RF band for transmission. Including the IC HFA3861A and PN codes and the channel filter, the DSSS transmitter of NKRWARPLINKP is implemented with the identical reference circuit of FCC ID:OSZ3163B1, which grant by FCC.[2] The schematic [3] is the evidence of implementation from Intersil's reference design.

For the receiver aspect, The PG can be viewed as signal to jammer (interference) ratio at the receiver after the despreading operation (removal of PN).[4] The figure below illustrates the concept of PG for DSSS spectrum as seen at the receiver end. The unspread signal is the narrowband PSK signal before applying the wideband modulation. The spread signal is with the addition of the wideband modulation utilizing the PN code. It is apparent that the spread signal is wider in frequency BW but with lower power spectral density per Hz. PG for a DSSS system can be visualized as the jamming margin that exists as the difference between the unspread and spread waveforms. The NKRWARPLINKP implement the identical receiver design as that of OSZ3163B1. This leads to the identical receiver BW. The schematic [3] is the evidence of implementation from Intersil's reference design.

Combining the identical DSSS transmitter and receiver implementation (the same IC, P/N code, and receiver filter) as Intersil's reference circuit, the PG of NKRWARPLINKP should be identical to that of FCC ID:OSZ3163B1.



[1]. File: HFA3861A.pdf

[2]. File: Grant\_Form\_OSZ.zip

[3]. File: Schematic\_2411.pdf

[4]. File: PG\_Intersil.pdf