

Mellinger, David K

From: EOS <chris@embeddedocean.com>
Sent: Thursday, September 14, 2023 7:21 AM
To: Mellinger, David K
Cc: Turnbull, James
Subject: Re: WISPR system sensitivity

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Hi Dave

The wispr sensitivity for a 24 bit word over the 5V reference voltage is:

$$q = 5.0/8388608.0;$$

So you multiply the sample value by q to get volts.

Then you'll need the pre-amp gain curve for the system and the hydrophone sensitivity.

Assuming that it's a similar pre-amp as used in the past (made by Haru), then the gain curve is probably similar to this:

% Preamp gain (dB re: V^2/Hz) vs. frequency (Hz) measured by Haru

Freq = [1 2 5 10 20 50 100 200 500 1000 2000 5000 10000 20000 30000 40000 50000 60000 70000 80000
90000 100000 110000 120000 130000 140000 150000 160000 170000 180000 190000 200000];

Gain = [1.0 8.3 14.2 16.1 16.5 16.9 17.1 17.9 20.3 24.7 29.9 37.1 41.9 45.1 45.9 46.3 46.3 46.2 46.1 46.0 45.7
45.5 45.2 45.0 44.7 44.5 44.2 44.0 43.6 43.3 43.1 42.8];

Then with the hydrophone sensitivity, for example:

hydro_sensitivity = -175.7; % HTI 92 WB sn 1247004

The signal level in dB re: $1 \mu Pa^2/Hz$ is plotted as:

semilogx(Freq/1000, 10*log10(psd) - hydro_sensitivity - Gain);

where the psd is found for the signal (in volts) and has units of $dB V^2/Hz$.

Let me know if you need more matlab scripts to plot noise levels and data.

You can also send me a data file and I can test to see if it looks right.

Chris

On 9/13/2023 8:30 PM, Mellinger, David K wrote:

Hi Chris,

Do you know the system sensitivity of the WISPR2 we used? What voltage level translated to a certain sample value?

Thanks,
Dave