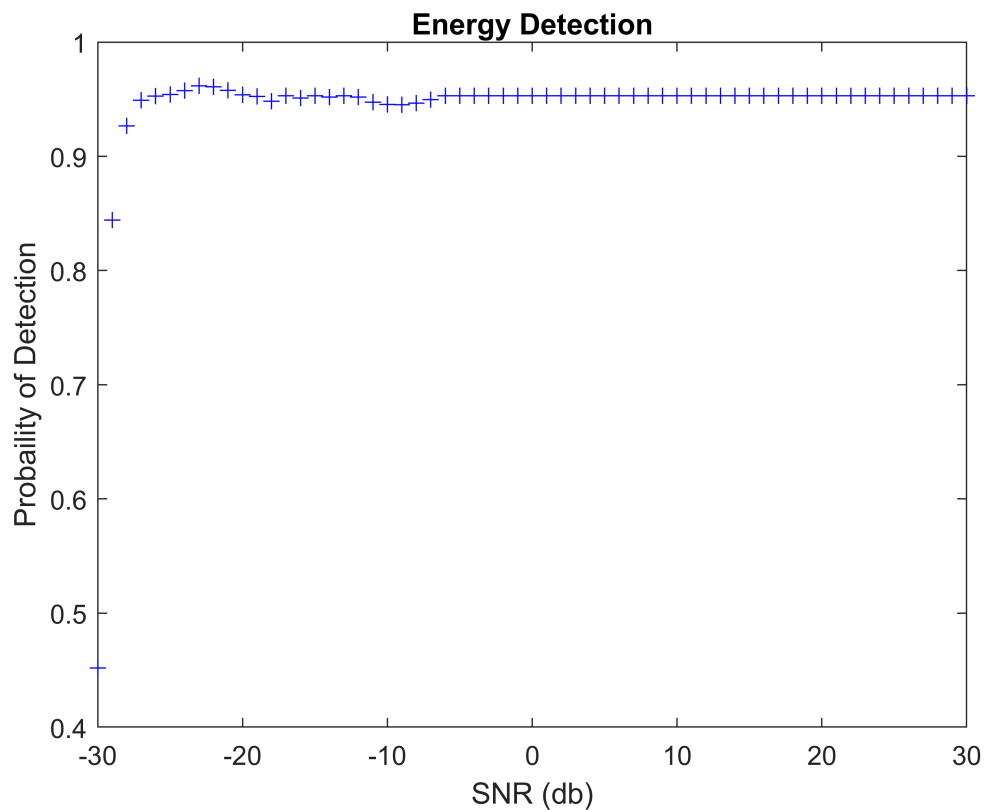


## Probability of detection

```
clear % Clear all data stored in variables
Am = 1; % 1V Amplitude
SR = 48000; % 48 KHz Smampling Rate
f0 = 13e+3; % 20 KHz
duration = (127/SR); % ~ 2.6 ms
t = 0:1/SR:duration; % Time Vector
```

```
sinusPulse = Am*sin(2*pi*f0*t);
mySNR = -30:1:30; % SNR buffer
threshold = 30e5;
detectProbability(sinusPulse,mySNR,threshold)
```



```
function detectProbability(yourSignal,snr,threshold)
    N = length(yourSignal);
    for i = 1:length(snr)
        Pd_buff(100) = 0;
        for j = 1:100
            a(N) = 0;
            yourSignal = awgn(yourSignal,snr(i));
            a(1) = abs(yourSignal(1)).^2;
```

```

        for k = 2:N
            a(k) = a(k-1) + abs(yourSignal(k)).^2;
        end
        Pd_buff(j) = sum(a > threshold)/N;
    end
    Pd = sum(Pd_buff)/100;
    plot(snr(i),Pd,'b+');
    hold on
    title('Energy Detection')
    xlabel('SNR (db)')
    ylabel('Probaility of Detection')
end
hold off
end

```