VE7BQH Analysis 6M8GJ Yagi Mounted on a 20' Mast While Elevated at Various Angles

I have always suggested to new 6m EME stations that they needed to have around 14 antenna dBD antenna gain and a kilowatt to be able to work similarly-sized stations. Often, single yagi stations (without any buildings or other "ground clutter" on the ground in front of the antenna) can generate around 4 dB gain in a ground gain lobe with their single yagi aimed at the horizon. Typically, a good single 7 element yagi 7m above flat ground, without obstructions below it (such as a rooftop, or an HF beam), will have a lower "main" lobe around 7 degrees elevation and a second lobe up around 15 degrees, which is still within a dB or two of the lower lobe. Of course, usually the ground slopes one way or another, and that will lower or raise the lobes. That is why it is important to run 6m EME skeds with single yagi, horizon-only stations over the entire period as the moon moves between zero and 15 or 20 degrees elevation. And if an antenna sees a *negative horizon* (due to very high antenna and a totally unobstructed horizon determined by the Earth's curvature), there often is a "bonus ground gain lobe" at or slightly below zero degrees elevation, so you sure want to take advantage of that, too!

Of course, the type of ground also influences the degree to which extra ground gain can be generated, and the very best is when the antenna is mounted above salt water with an unobstructed horizon. Few of us have antennas in such locations, which is part of the reason why it is so exciting to go on a DXpedition to someplace where your antenna ***can*** look right out over the ocean!

But once the antenna is elevated, the potential for ground gain is lost. That is why most stations intending to extend their operating ability past just moonrise and moonset add more antennas so they can elevate and keep the overall antenna gain required for 6m EME. When I go on 6m EME DXpeditions with my single M^2 6M8GJ yagi and a kw, I consider my station to be very marginal for EME. It has always surprised me to make so many contacts with single yagi stations – some of whom also are elevated! If part of the reason I am so successful is because my antenna is so close to the ground, then I want to make sure I take advantage of that!

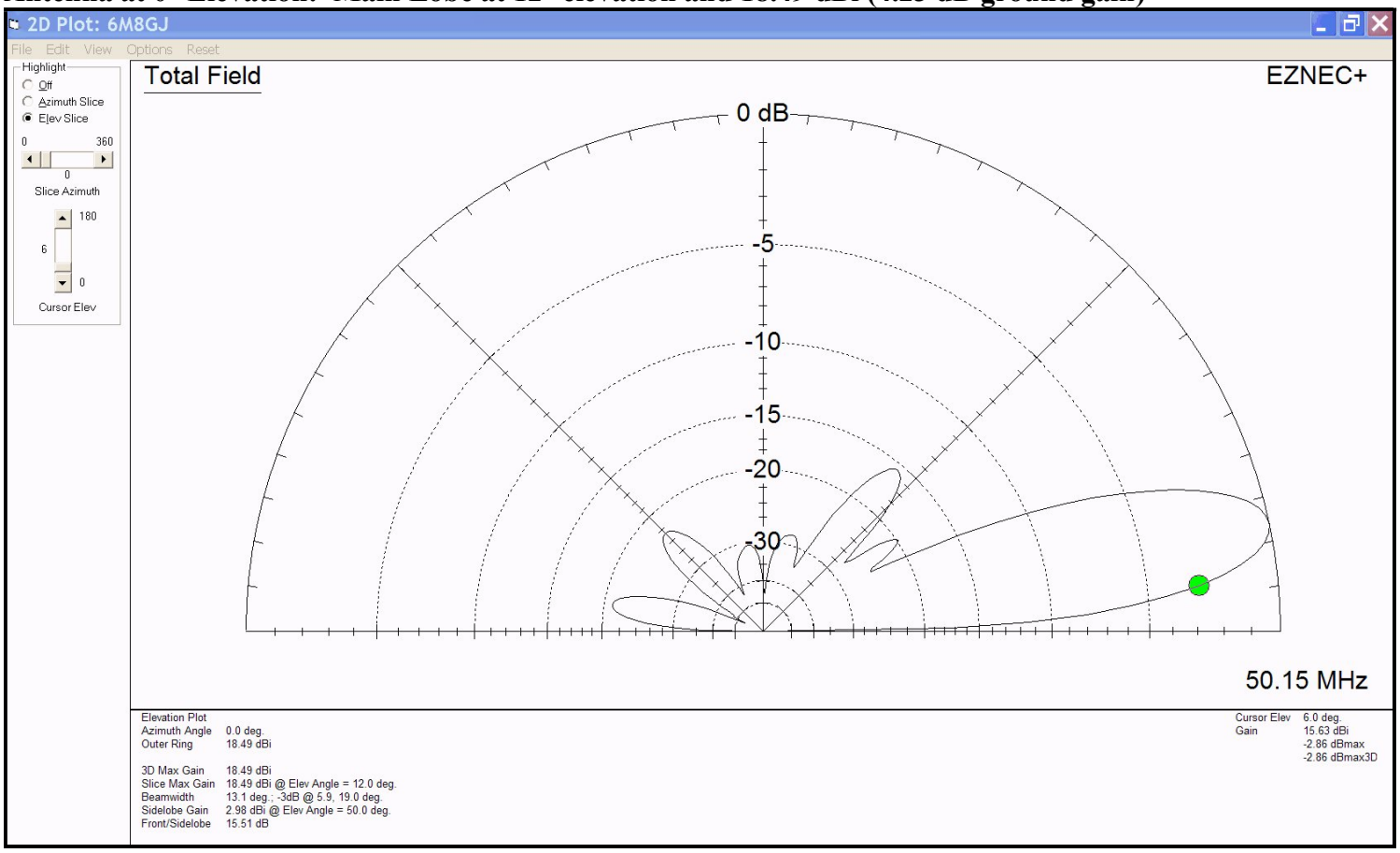
According to VE7BQH's modeling, the 6M8GJ yagi has a free space gain of 12.12 dB gain compared to a dipole. If this is to be compared to a theoretical isotropic radiator in free space, you would add 2.14 dB more gain, bringing its free space gain to ***14.26 dBi***. As you can see from the following plots, the effect of average ground on the gain and elevation of the lobe is quite noticeable even as the antenna is elevated up to 45 degrees. Having manual elevation on my DXpeditions, one of the hardest things for me to do is to keep the antenna aimed at the horizon when I see the moon climbing high in the sky!

However, these plots will make it easier to leave it on the horizon until it is over 15 degrees. And then when I ***do*** go out to elevate the antenna, I will be sure to aim it up around 23 degrees! And if you are fortunate enough to have a 6m array with elevation, please take a look at these plots, and you will understand why I ask you to try to contact me when my moon is below 45 degrees, when I have a little extra gain on my end!

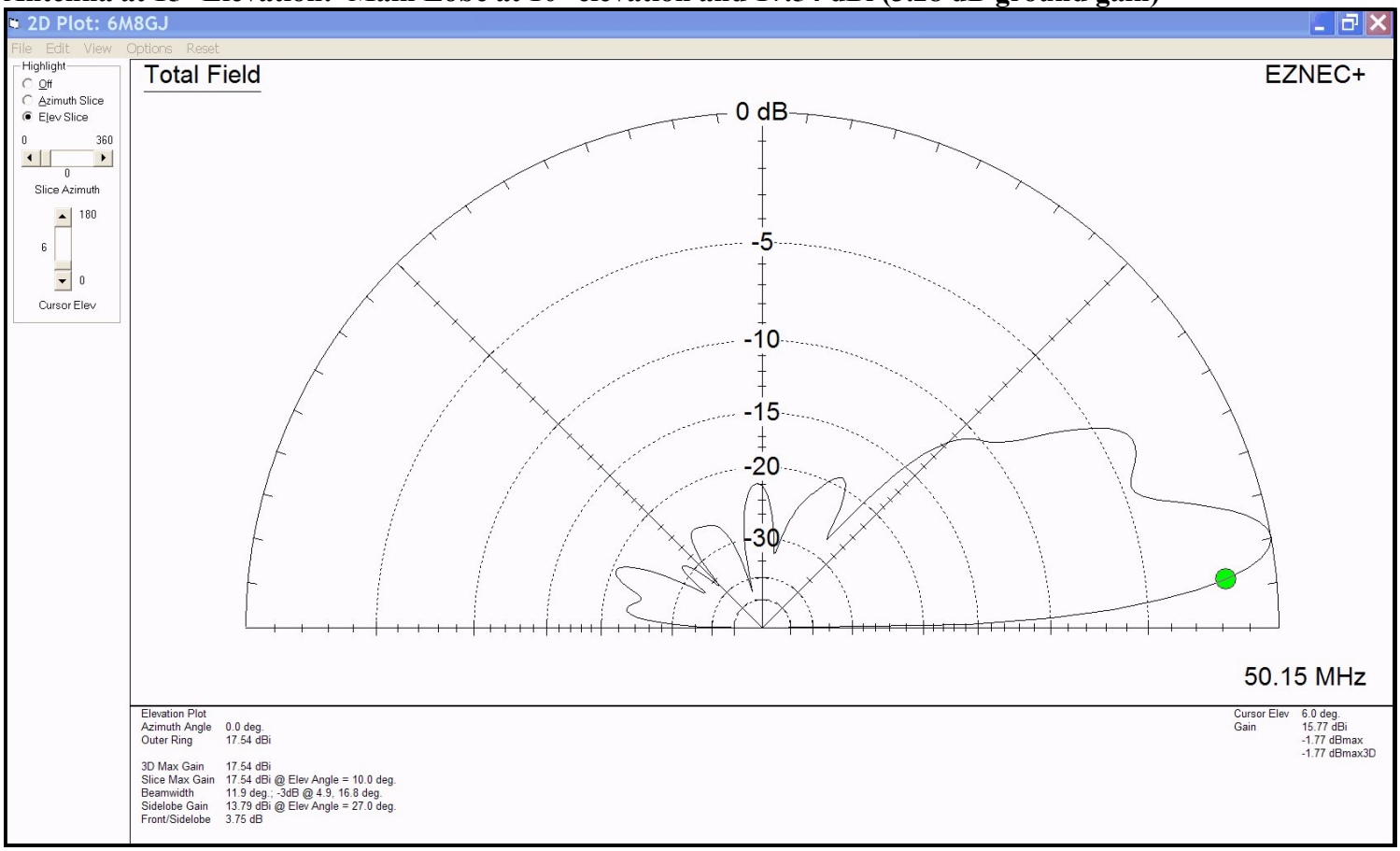
Many thanks to Lionel, VE7BQH for all his effort on this project and helping me work toward the most success possible on my 6m EME DXpeditions!

Good DX and VY 73 to all! Lance Collister W7GJ, 15 August, 2015

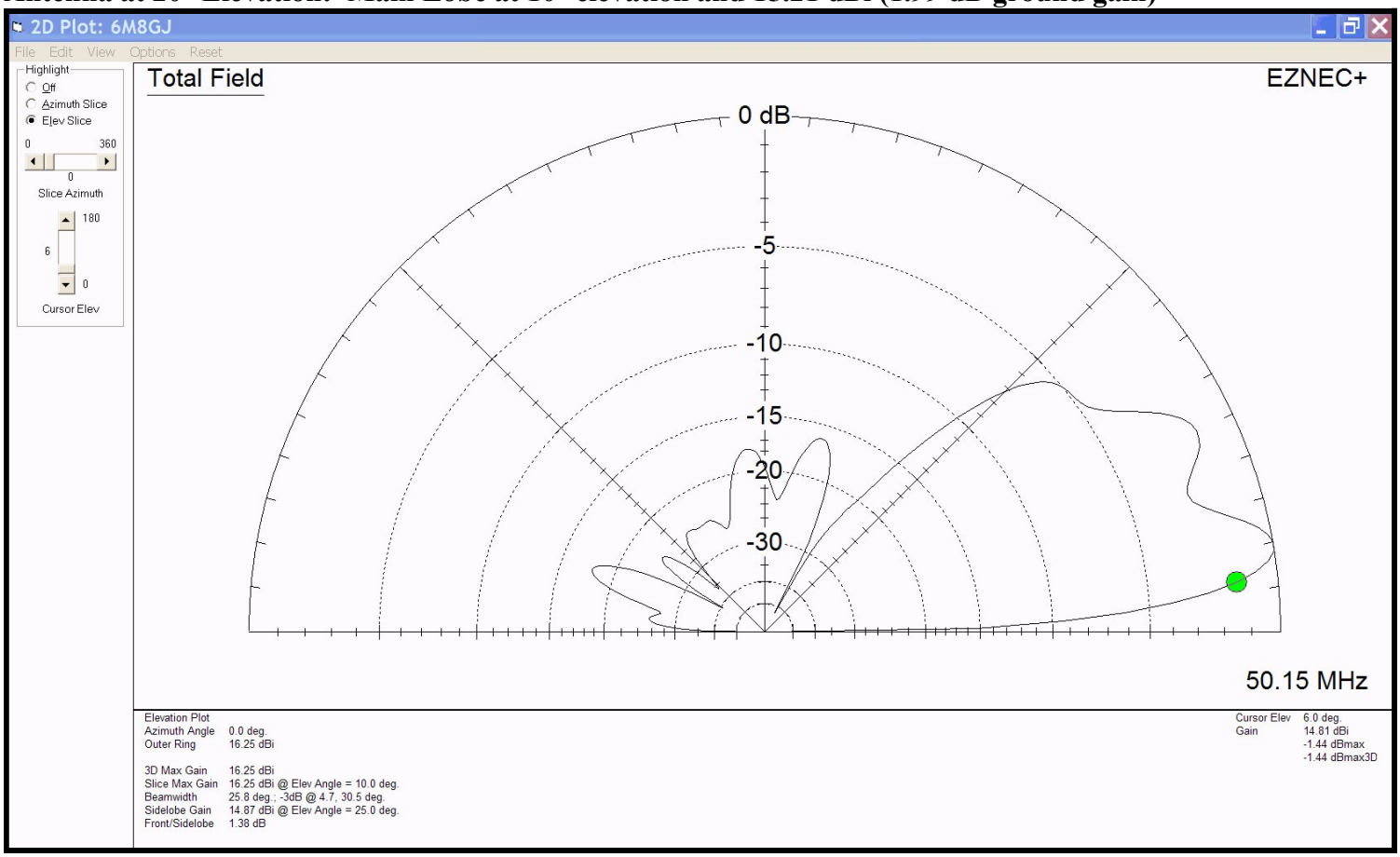
Antenna at 0° Elevation: Main Lobe at 12° elevation and 18.49 dBi (4.23 dB ground gain)



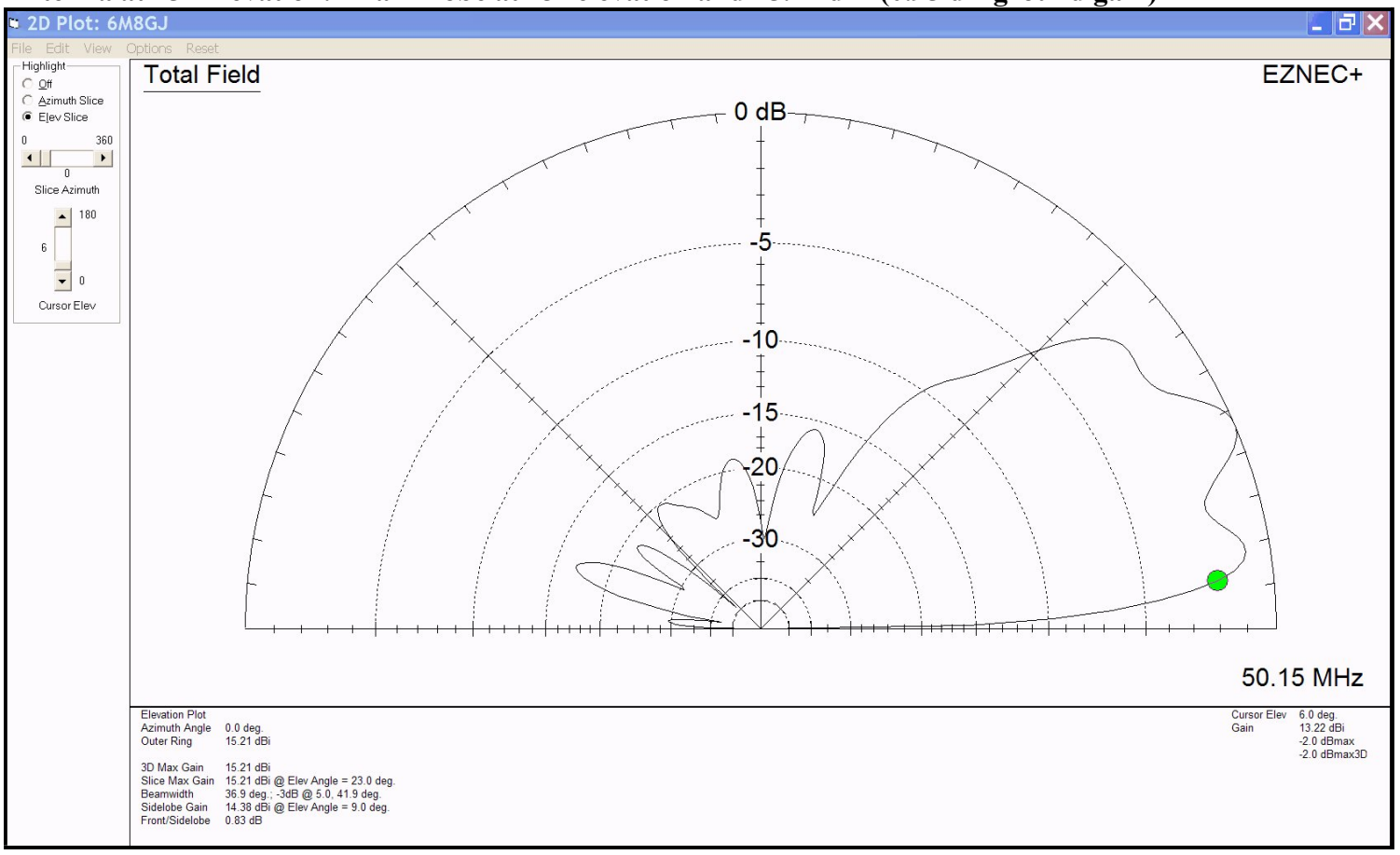
Antenna at 15° Elevation: Main Lobe at 10° elevation and 17.54 dBi (3.28 dB ground gain)



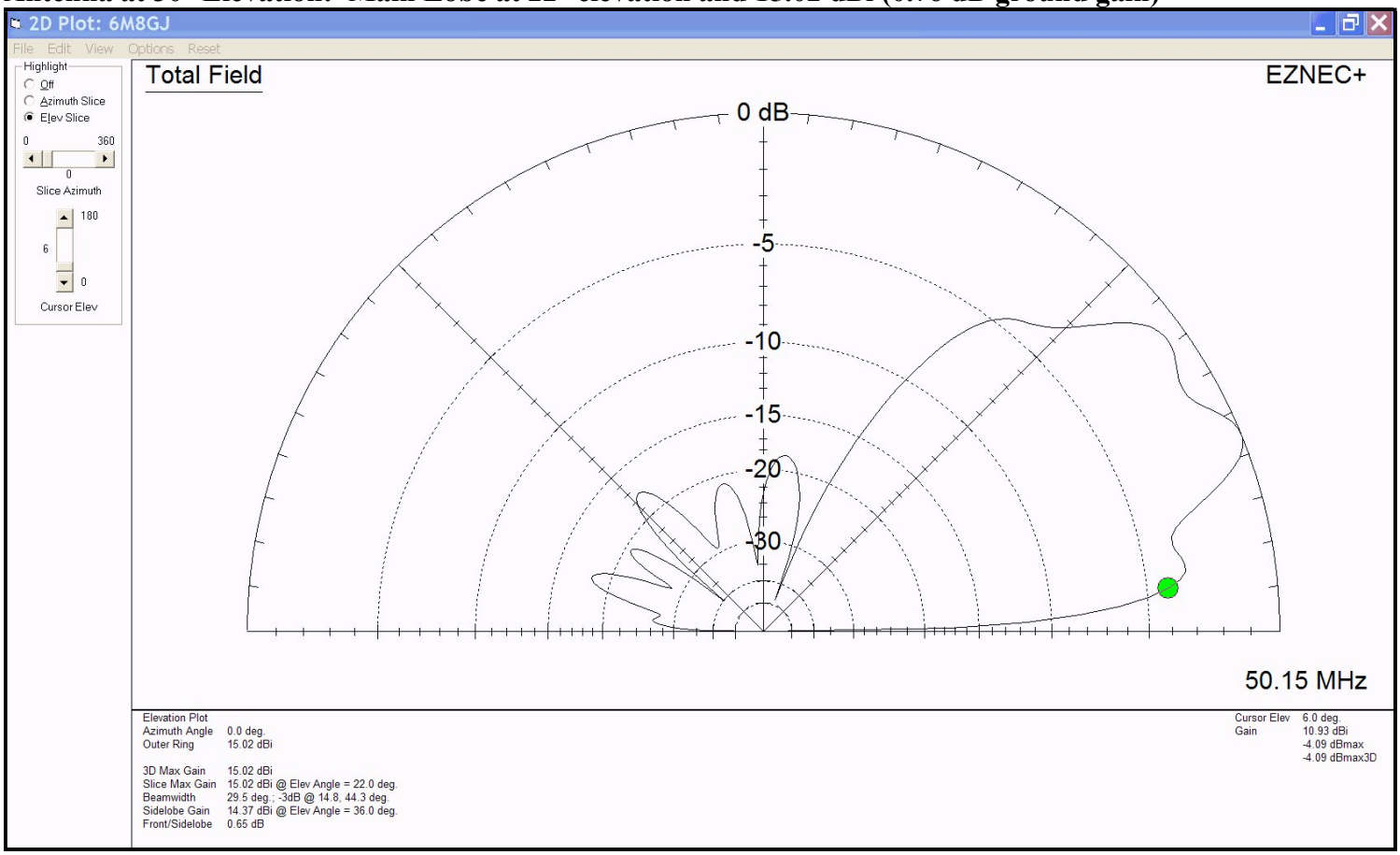
Antenna at 20° Elevation: Main Lobe at 10° elevation and 15.21 dBi (1.99 dB ground gain)



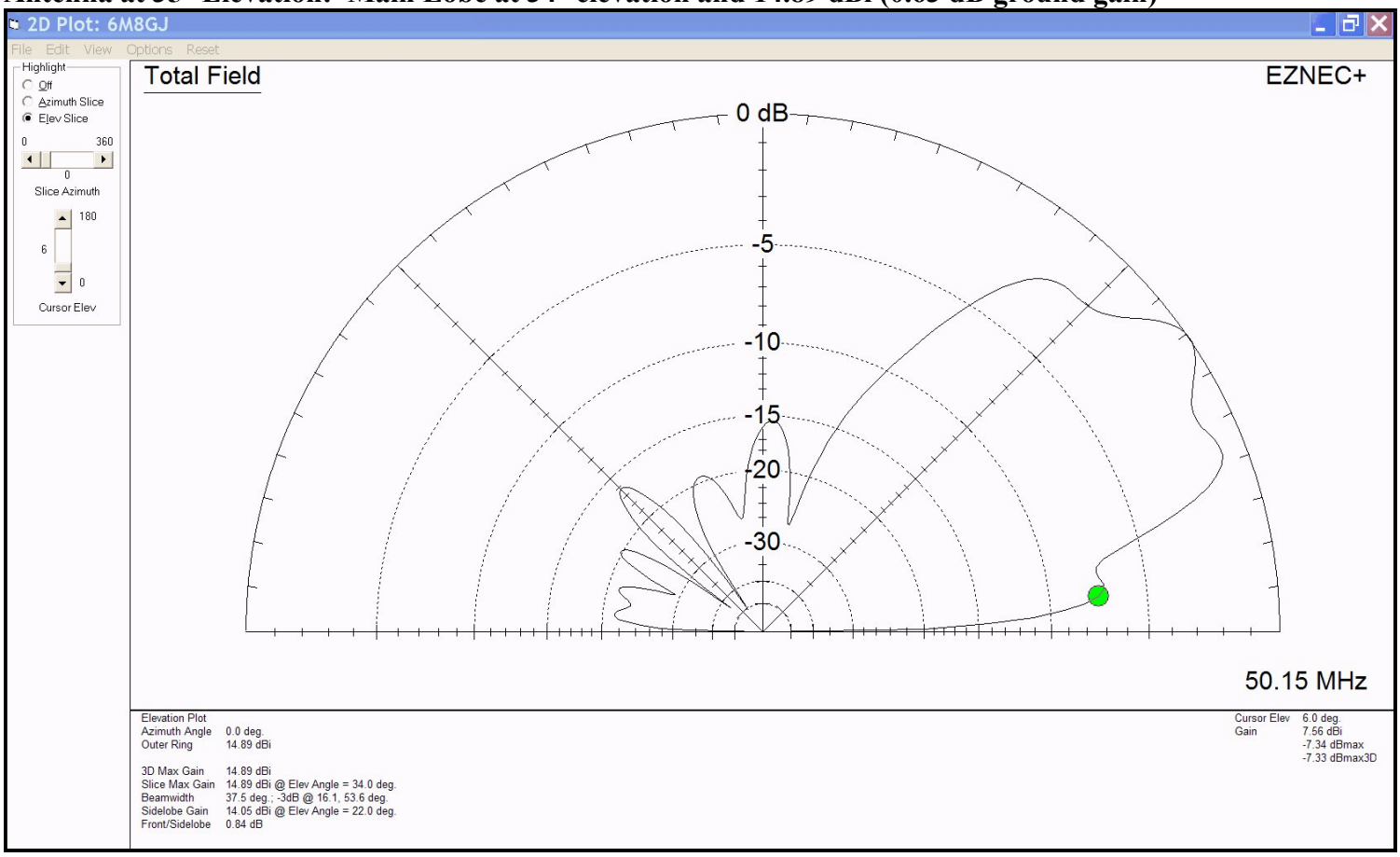
Antenna at 25° Elevation: Main Lobe at 23° elevation and 15.21 dBi (0.95 dB ground gain)



Antenna at 30° Elevation: Main Lobe at 22° elevation and 15.02 dBi (0.76 dB ground gain)



Antenna at 35° Elevation: Main Lobe at 34° elevation and 14.89 dBi (0.63 dB ground gain)



Antenna at 45° Elevation: Main Lobe at 46° elevation and 14.47 dBi (.21 dB ground gain)