

7signal Solutions Sapphire Eye model 2001 antenna patterns

3/12/14

The Sapphire Eye 2001 has an internal sectored antenna system comprised of 6 broadband etched copper antennas arranged in a circle on a single circuit board. Each antenna has a horizontal (azimuth) beamwidth of 60 degrees. Each covers one 60-degree sector in the horizontal azimuth plane. See photo in Figure 1.

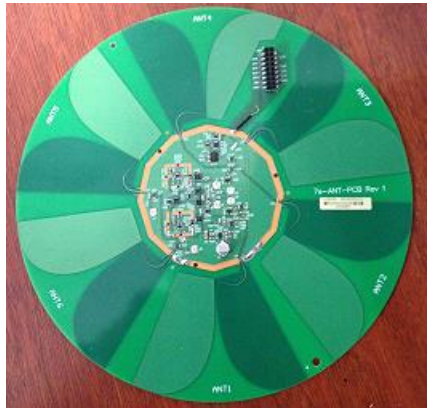
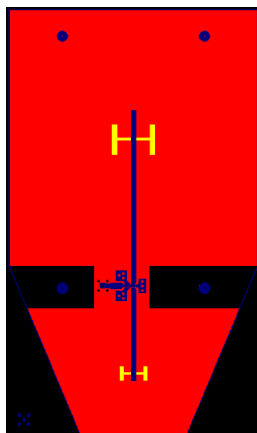


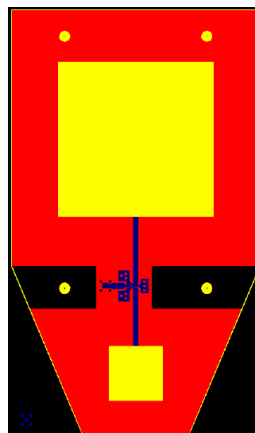
Figure 1. Sapphire Eye SE2001 Internal 6-Sector Antenna board

Each sector's antenna gain is 6dBi. The antenna switching network (center of board layout) allows the single Wi-Fi radio on the processor board to select which antenna sector is desired at any one time.

The SE2001 antenna system was designed to match the previous generation Sapphire Eye (FCC ID: YLF-ABGN-EYE-APU3) with regard to beamwidth and gain, and thus all pattern plots are shown in comparison to the APU-3 antenna, herein called the Reference antenna. The Reference antenna was originally measured and characterized at a calibrated antenna range at VTT Technical Research Centre of Finland. The Reference antenna is a slot-coupled patch gain antenna, shown below in Figure 2.



Red: layer 1 ground plane
Yellow: ground plane slots
Blue: layer 2 driven element



Yellow: layer 3 patch radiators
(2.4 & 5 GHz)

Figure 2. Reference Patch Antenna construction

The following gain and directivity plots shown in Figures 3 and 4 below were taken in a calibrated antenna range at VTT Technical Research Center in Espoo, Finland. These are shown since they are the reference antennas for the current Device Under Test (DUT), or Sapphire Eye model 2001.

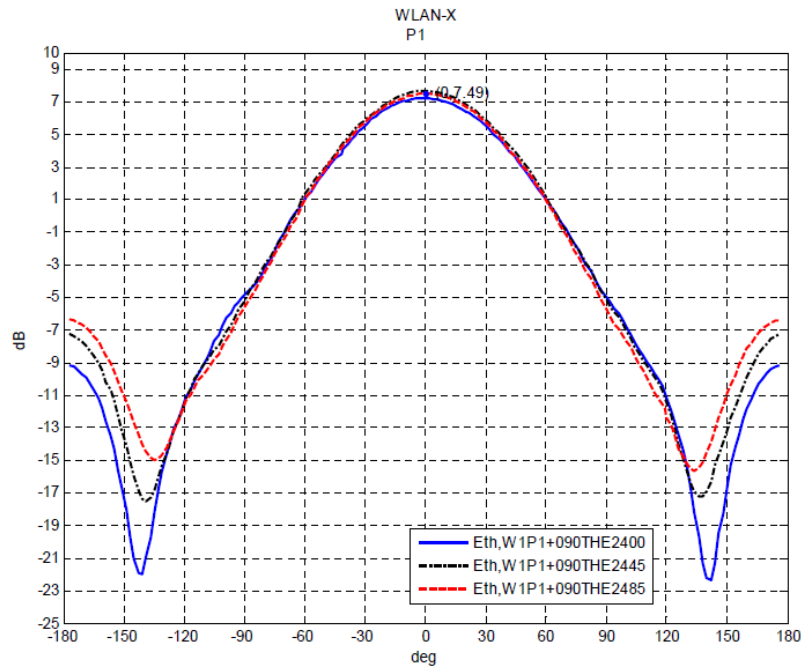


Figure 3.

Reference Patch Antenna Horizontal Pattern with 7dBi Gain

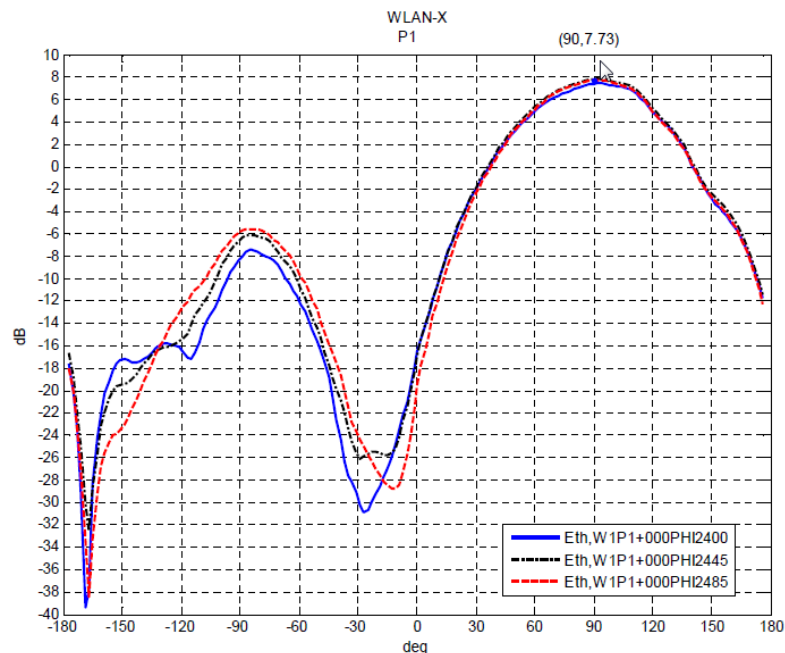


Figure 4.

Reference Patch Antenna Elevation Pattern with 7dBi Gain

The horizontal-plane pattern of the Sapphire Eye 2001 antenna under test (DUT) is plotted below in red as compared to the Reference antenna plot in blue. The DUT exhibits about 6dBi of gain and a 6dB beamwidth of approximately 75 degrees as shown in Figure 5 below.

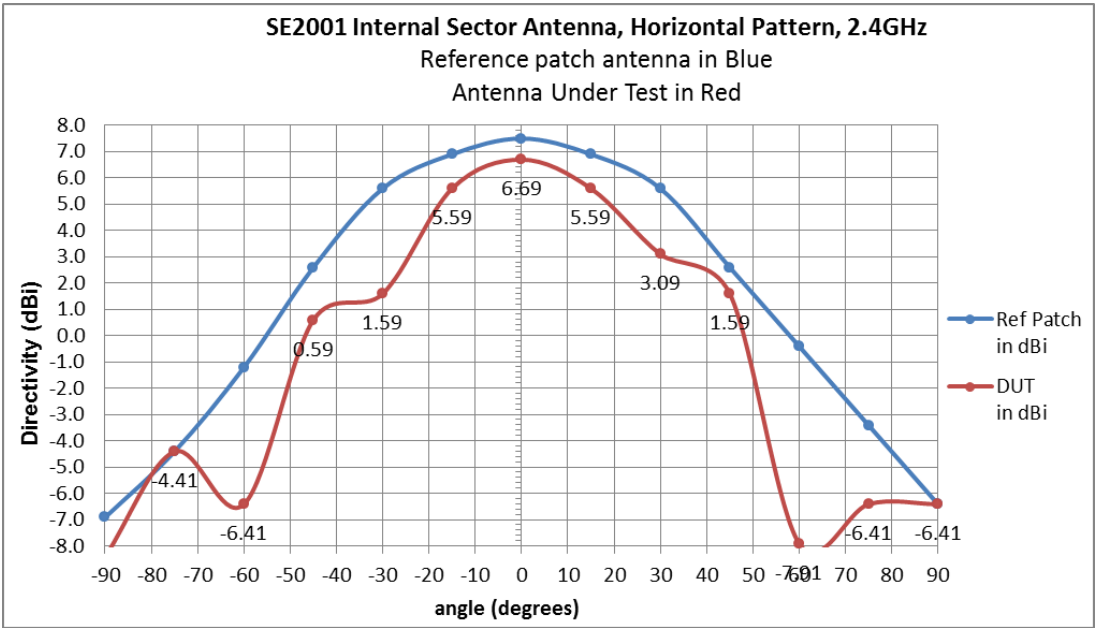


Figure 5.
Device Under Test (DUT) Antenna Horizontal Directivity and Gain plot at 2.4GHz

The elevation measurements are similarly plotted below in Figure 6 as compared to the 7dBi Reference antenna from 0 degrees (straight down) through 180 degrees (overhead).

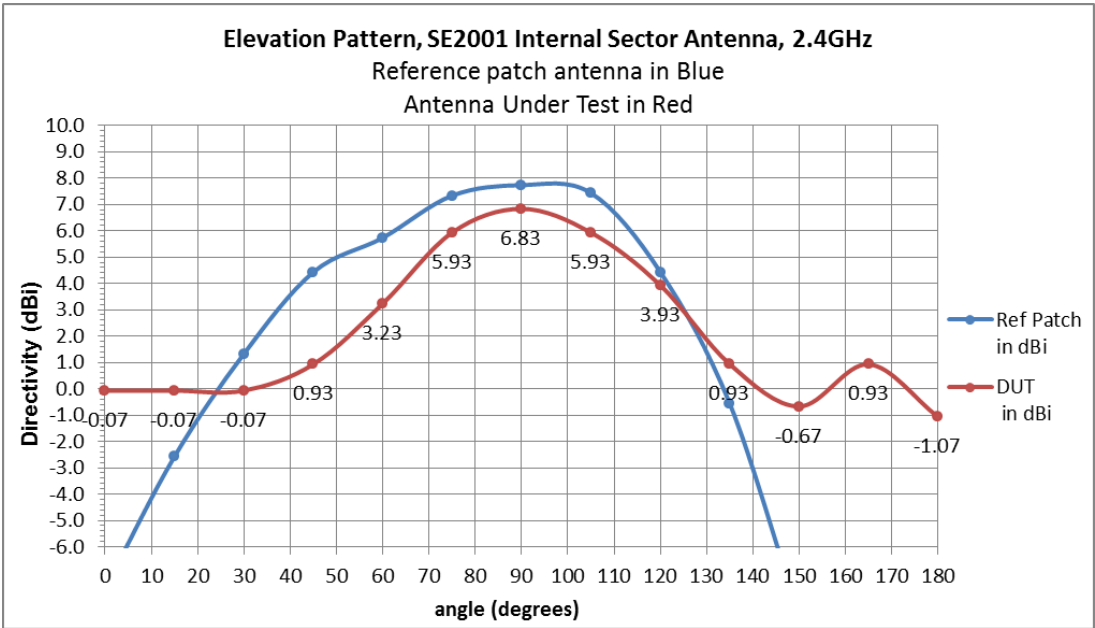


Figure 6.
Device Under Test (DUT) Antenna Elevation Directivity and Gain plot at 2.4GHz

Similar plots at 5.4GHz for horizontal (azimuth) gain and directivity as well as elevation gain and directivity, are shown below in Figures 7 and 8, relative to the 7dBi Reference antenna.

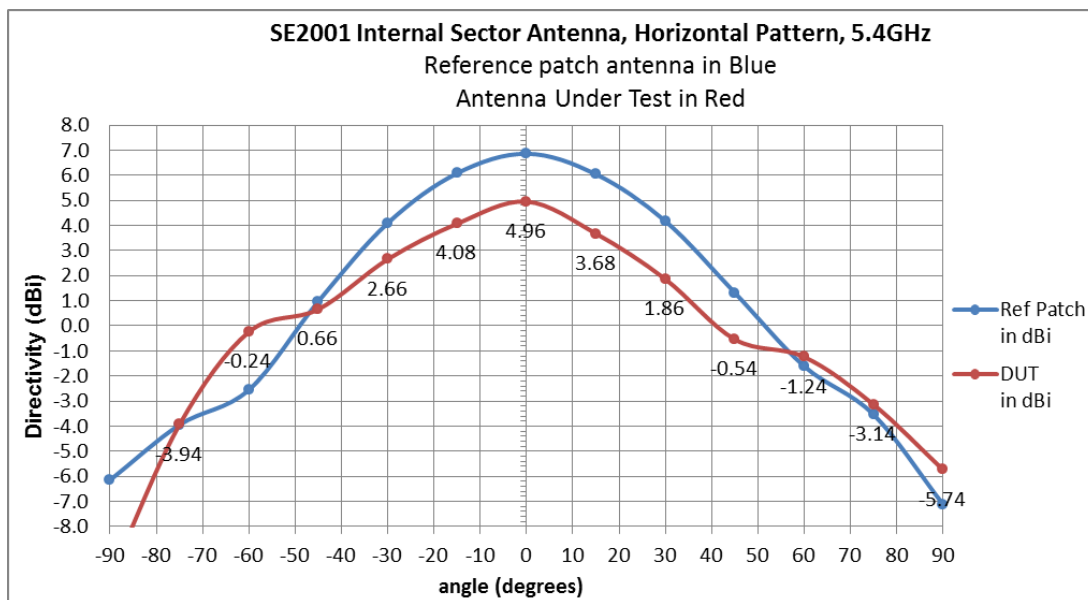


Figure 7.

Device Under Test (DUT) Antenna Horizontal Directivity and Gain plot at 5.4GHz

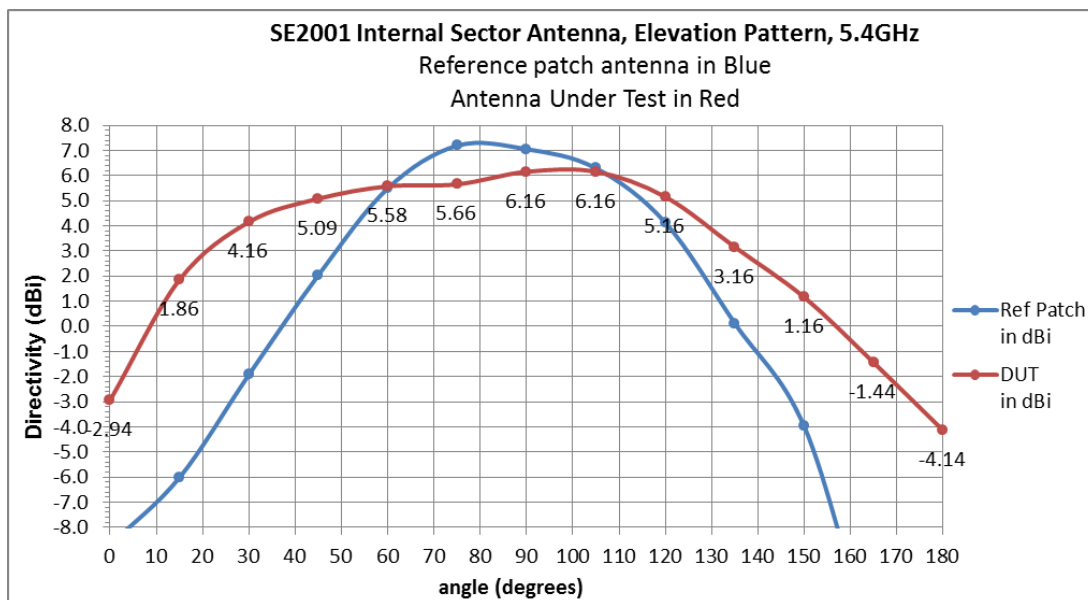


Figure 8.

Device Under Test (DUT) Antenna Elevation Directivity and Gain plot at 5.4GHz

End of document, Sapphirre Eye model 2001 6-sector PCB antenna and switching system.