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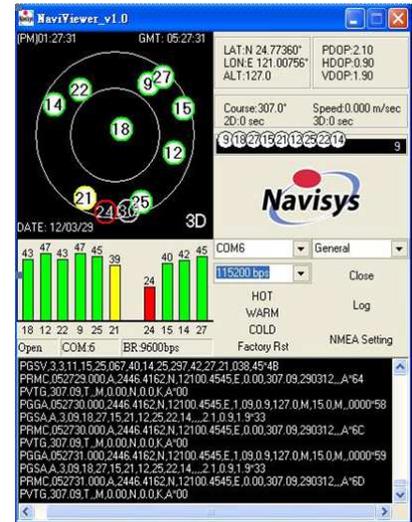
Tips to design in GPS modules inside target platform

To **test the performance** of GPS receiver simply, Navisys provides a useful and helpful utility - **NaviViewer**. Through the utility, the distribution of visible and used satellites and their signal strength, and the time-to-first-fix by issuing cold start could be measured easily.

Common factors that affects the GPS performance -

The GPS signal is pretty low, less than -130 dBm. This weak signal is **vulnerable to the EMI** of host main board. GPS central **frequency**, 1.575 GHz, might be **shifted by the outside housing material** of host machine.

Appropriate **ground support** could enhance the GPS performance.



Interference - To measure whether there is any interference caused by host main board, just test the GPS module **standalone** with USB data cable or on the evaluation kit under open sky, and compare it by putting it **inside target platform** in the same time at the same location. Please find better location of target platform or adjust the main board circuit and layout to reduce the interference if it affects the GPS reception sensitivity.

GPS frequency shift - The comparison of the GPS sensitivity with and without host's housing could be used to measure whether the housing material and ground plane of host machine affects the GPS antenna effectiveness. If the distribution of GPS satellites and GPS signal is degraded significantly, the GPS antenna needs to be fine-tuned to match the housing material and ground plane to achieve the optimum central frequency and field pattern.

Antennas - There are different kinds of antennas adopted in Navisys GPS modules. The ceramic based patch antenna is from standard one (25x25x4 mm, 10 MHz bandwidth) to tiny one (12.8x12.8x4 mm, 6 MHz bandwidth) or even smaller, and also slim patch antenna (20x6x4 mm, 6 MHz bandwidth). The patch antenna with narrow bandwidth commonly needs to adjust the central frequency affected by the housing material. With only 5.2x3.7x0.7 mm, chip antenna is a break-through technology to support the ultra-thin GPS module. The matching circuit of the GPS module with built-in chip antenna needs to be adjusted based on the ground plane of the target platform on which the GPS module is mounted.