

## METHODOLOGY

### CST Software

And here in our project for designing the antenna we use CST software. CST studio suite is a high performance 3D EM analysis software package for designing analysing and optimizing electromagnetic (EM) components and systems. Here the solvers can perform hybrid simulations, giving engineers the flexibility to analyse the whole systems made up of multiple components in an efficient and straightforward way. CST studio suite is used in leading technology and engineering companies around the world and offers considerable product to market advantages, facilitating shorter development cycles and reduced cost.

### Vector Network Analyzer

This part is very crucial because it works with the impedance of the antenna. It is known that impedance is the very important for an antenna mainly which works at RF frequencies or in high frequencies. The impedance of the antenna should be close to the transmission line. If these do not match to each other, a very little power will be transmitted or received then. So for designing an antenna impedance measurement is one of the major tasks. When an antenna is being measured, the environment also plays a vital role. If the environment or object beside the antenna affects the antenna, it will alter the radiation pattern. So, input impedance also will be affected. Here comes a term which is known as self-impedance. It means the impedance of an antenna in free space with no objects around this. So, as impedance is an important part so to measure this parameter right equipment is needed. Vector Network Analyzer is the right equipment here to measure impedance. It is known as a measuring tool which measures the input impedance as a function of frequency. Besides, return loss or S11 and VSWR can also be measured or plot by this tool.



Fig 3.1: Vector Network Analyzer (VNA)

To start the operation in VNA, at first calibration is must. It is a very easy task. The cables which is udes as the probes should be taken. It remains connected to the VNA to the antnna. Then some simple procedures should be followed out so that the effects of the cables is calibrated out. Primarily, “cal kit” is supplied to VNA which contains 50 ohms load prior to the measurement starts. This 50 ohm is for open circuit load and short circuit load. After pressing the calibration button, we will follow the instruction the VNA gives us. It is mendatory to apply the loads to the end of the cables and data will be recorded here.



Fig 3.2: Antenna connection to the probe

We don not need to what is going on. We just need to follow the instruction as VNA tell us to do. It will handle the calculation pretty well. Now the antenna which is made practically should be connected for testing. The frequency range shuld be set as weel. As we have worked with 2.45 GHZ, it will be set at first. When S-parameter basically S11 parameter is measured, we are actually want to measure the return loss here. So in this circumstances, a small amount of power is supplied to the antenna by the VNA and VNA does measure how much power is reflected back to the VNA.

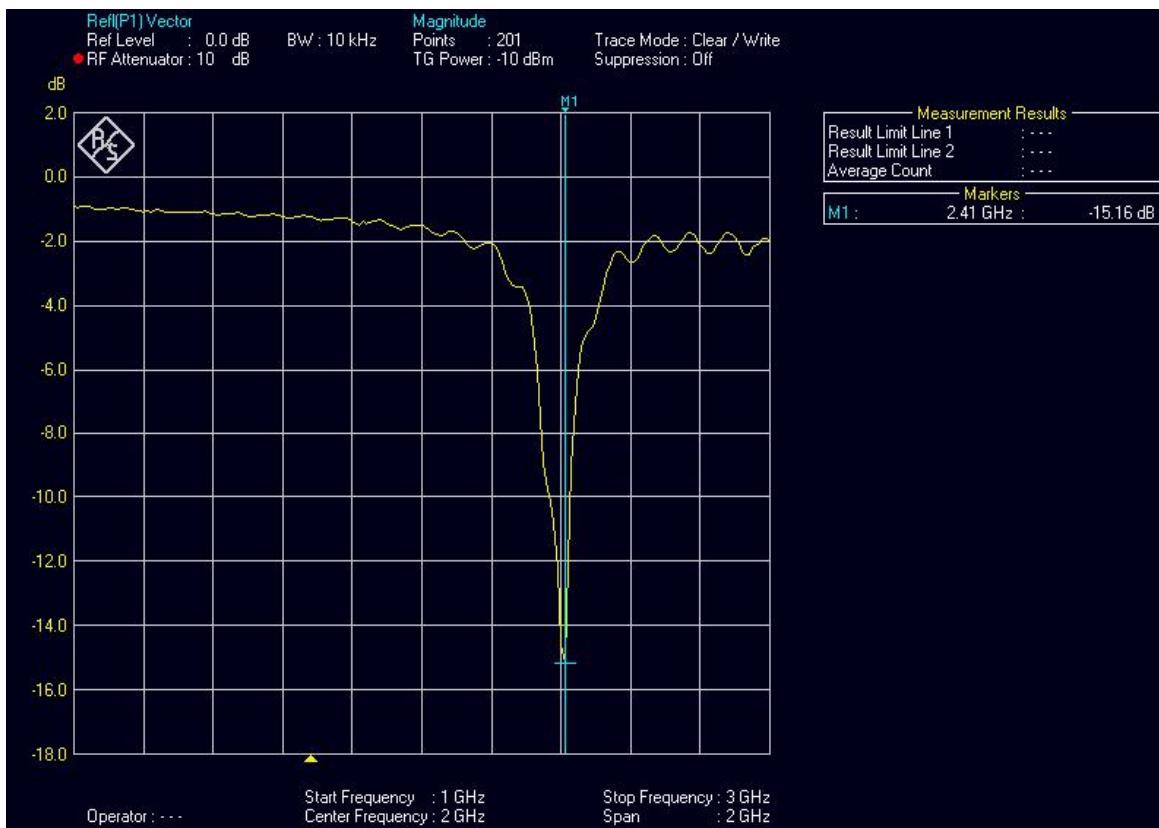


Fig 3.3: S11 parameter measurement using VNA