

# 2.4G antenna on PCB board design information

The main discussion is 2.4G PCB antenna, if not consider the cost and size, you can choose other antennas, such as patch antenna (small size, medium performance, medium cost) or external whip antenna (large size, high performance, high cost), while the PCB antenna is the lowest cost, medium-sized, as long as the design is right and can get enough performance of the antenna.

Three types of antennas are included:

Ultra-compact PIFA antenna: PCB antenna for Nano Dongle, due to PCB space constraints, the maximum gain will be smaller than other types of antennas by about 6dB, i.e., the working distance will be shorter by half. The size of the complete board made of this antenna and MCU is about 11mm\*18mm.

Normal PIFA antenna: PCB antenna used for Normal Module, occupies the largest PCB space, the maximum gain can reach 1.5dB, if the PCB area is enough, it is recommended to use this antenna. The size of RF Module board made by this antenna is about 15mm\*18mm.

Normal Wiggle antenna: PCB antenna used for Normal Module, the PCB space occupied is slightly smaller than the second, the gain is also

slightly worse than 1dB, can be used for the volume requirements of the wireless terminal, such as for the space is more compact wireless mouse and other equipment. The size of the RF Module board made from this antenna is about 13mm\*18mm.

### 1、Small size Nano Dongle with PIFA antenna design

The dimensions of the antenna are shown in the figure below (two layers of FR4, thickness 0.6mm):

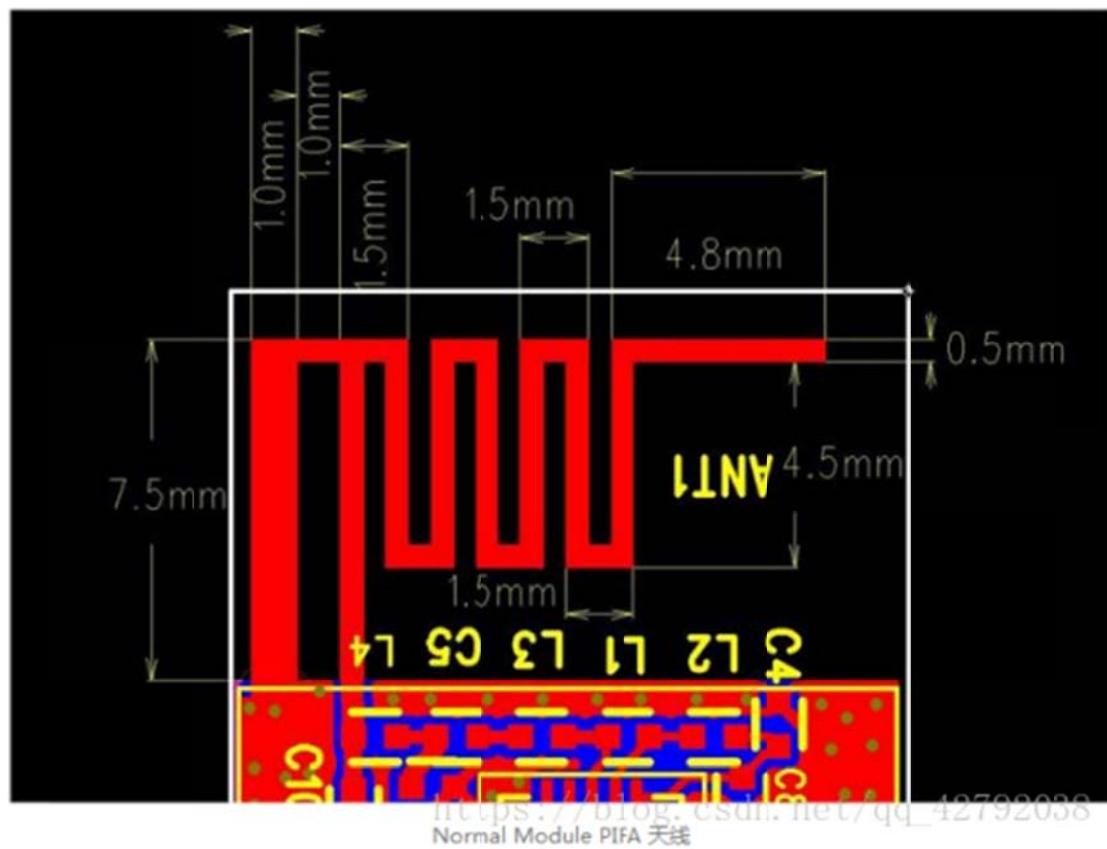
Where antenna line width A: 0.15mm; B: 0.25mm; C: 0.4mm

### 2. PIFA antenna design for larger size Normal Module

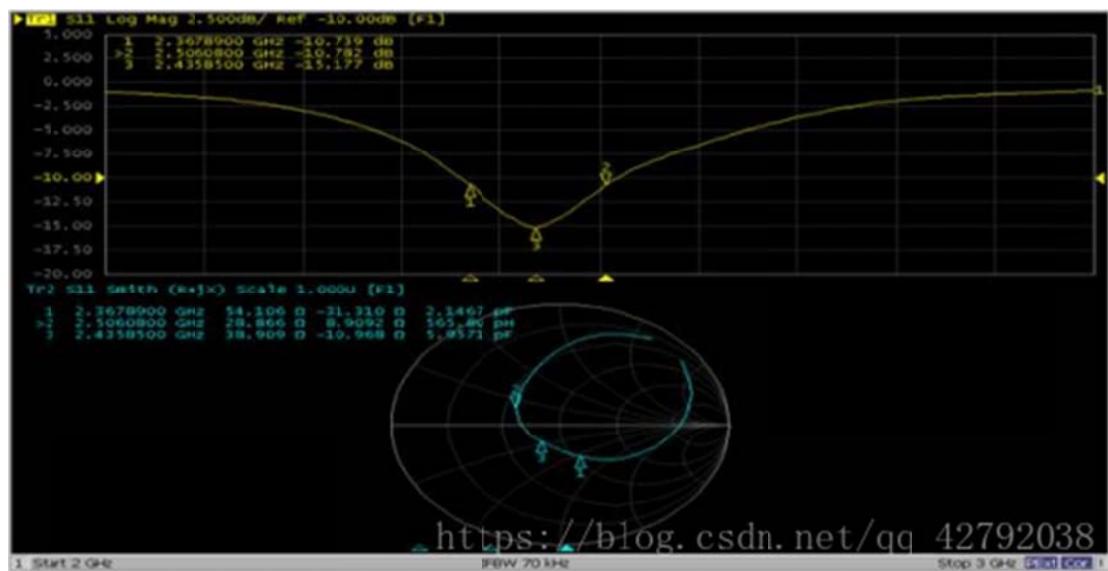
This antenna structure is the PIFA antenna in the Normal Module Complete Layout.

Antenna specific dimensions are shown below (the plate is two-layer FR4, plate thickness 1.0mm), if the thickness of the board and the board size is not consistent with this (the board thickness and the size of the ground area affects the performance), then Layout need to lengthen the antenna end dimensions, such as adding the last end of the length of 4.8m, for debugging the antenna with.

The size of the RF Module board made from this antenna is about 15mm\*18mm.

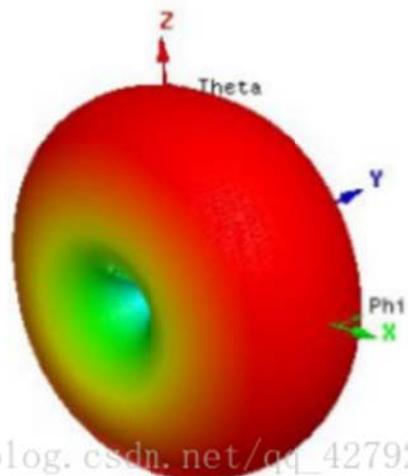
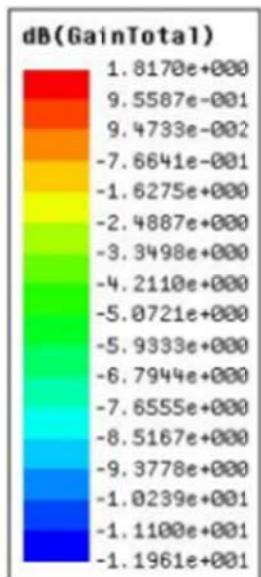
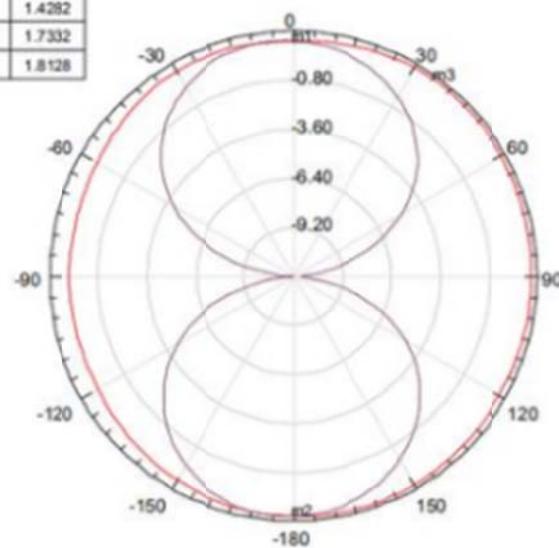


Antenna performance S11 is as follows, the operating band covers the entire 2.4G ISM band, you can see that the antenna operating bandwidth is larger than the Nano.



The 2D and 3D gains are as follows, the maximum gain of this antenna is about 6dB greater than that of the Nano, reaching about 1.5dB.

Name	Theta	Ang	Mag
m1	0.0000	0.0000	1.4282
m2	180.0000	180.0000	1.7332
m3	36.0000	36.0000	1.8128



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