

2.4G PCB 天线

2.4G PCB antenna

本节主要讨论的是 2.4G PCB 天线，如果不考虑成本及体积，可以选用其它天线，如贴片天线（小尺寸、中性能、中成本）或外置的鞭状天线（大尺寸、高性能、高成本），而 PCB 天线是最低成本、中等尺寸，只要设计得当又能获得足够性能的天线。

This section mainly talk about 2.4G PCB antenna. If regardless of cost, we can chose other antenna, like patch antenna (small size, medium performance, medium cost) or external whip antenna (large size, high performance, high cost), while PCB antenna have the lowest cost, medium size, and sufficient performance as long as being well designed.

本节中包括三种天线：

This section include 3 types of antenna.

- ◆ 超小型 PIFA 天线：用于 Nano Dongle 的 PCB 天线，由于 PCB 空间受限，最大增益会比其它几种天线小 6dB 左右，即工作距离会短一半。由此天线及 MCU 做成的完整板子大小为 11mm*18mm 左右。
- ◆ Utral-mini PIFA antenna: PCB antenna used for Nano Dongle. Due to limited space of PCB, the max gain will be 6dB less than other antennas, which means the effective distance will halve. Thus, the size of whole board with antenna and MCU is about 11*18mm.

小尺寸 Nano Dongle 用 PIFA 天线设计

Small size Nano Dongle using PIFA antenna

天线具体尺寸如下图（板材为两层 FR4,板厚 0.8mm）：

Size of antenna is shown below (material of board is double-layer FR4 0.8mm)

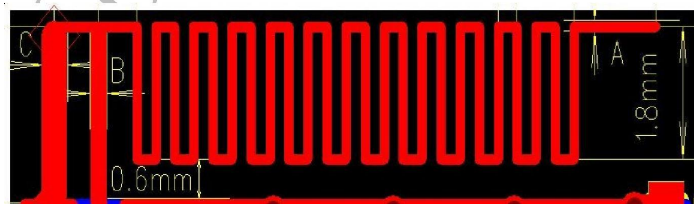


图 Nano Dongle PIFA 天线

Image 1 : Nano Dongle PIFA antenna

天线性能 S11 如下，工作频段覆盖整个 2.4G ISM 频段:

Performance of antenna S11, working frequency range cover the whole 2.4G range.

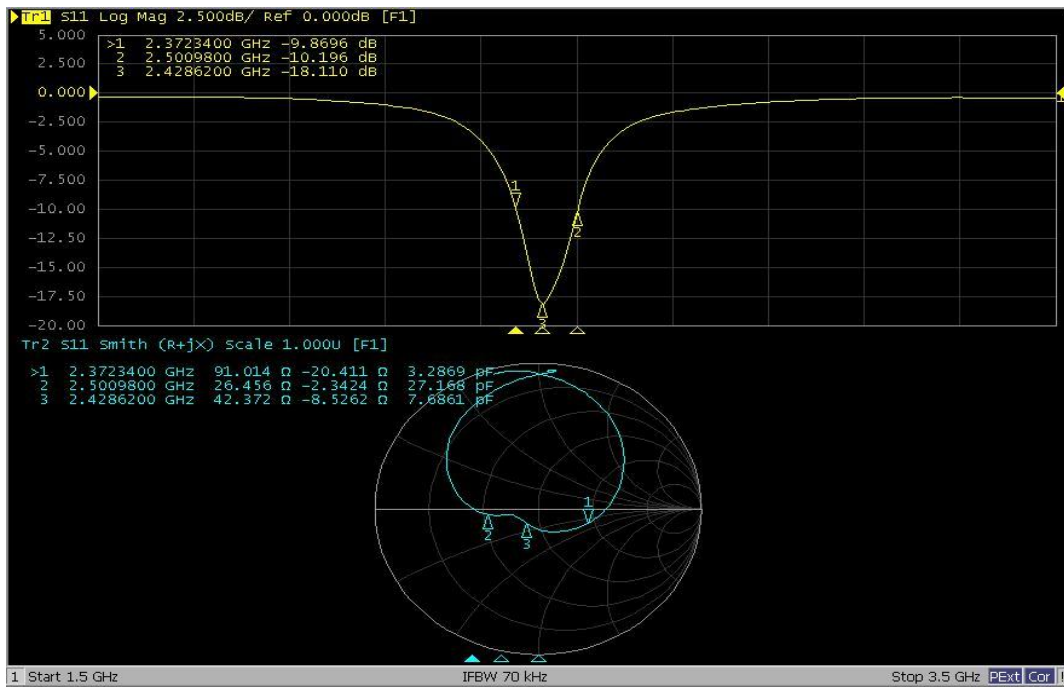
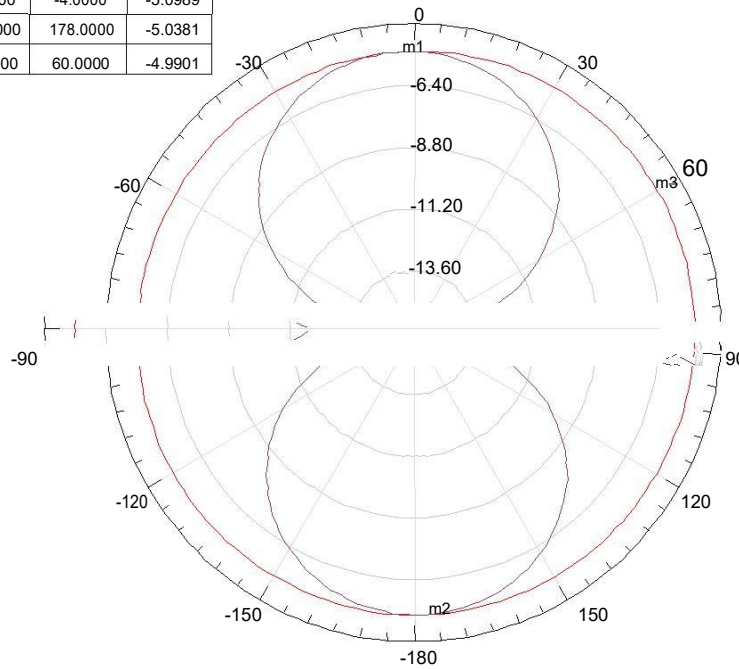


图 Nano Dongle PIFA 天线 S11

2D 和 3D 增益如下，该天线最大增益有-5dB 左右：

2D and 3D gain shown below, this antenna max gain is about -5dB

Name	Theta	Ang	Mag
m1	-4.0000	-4.0000	-5.0989
m2	178.0000	178.0000	-5.0381
m3	60.0000	60.0000	-4.9901



Curve Info	
—	dB(GainTotal)
Setup1 : Sweep1	
Phi='0deg'	
—	dB(GainTotal)
Setup1 : Sweep1	
Phi='90deg'	

Radiation Patterns(GAIN @ 2440MHz)

Plane	XY			XZ			YZ		
Frequency(MHz)	2400	2440	2480	2400	2440	2480	2400	2440	2480
Peak Gain(dBi)	-5.09	-5.11	-5.08	-4.97	-4.99	-4.98	-5.10	-5.08	-5.11

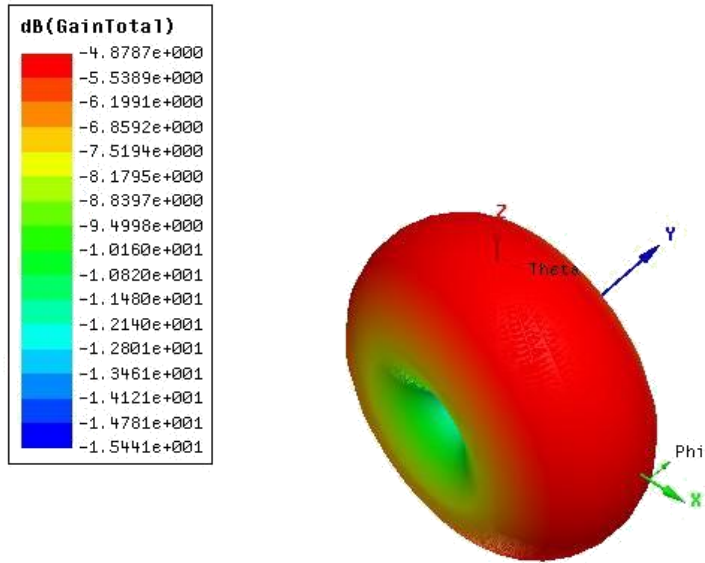


图 Nano Dongle PIFA 天线增益

Image2 Nano Dongle PIFA antenna gain

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