

Recommended Pad Layout of Carrier Board for Nano Module

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When the ThingMagic Division of Trimble designed the Nano module, we also designed a carrier board to accommodate it in order to allow it to be used with our Development Kit and to illustrate “best practices” for creating a host board that accommodates the module



Figure 1: Nano Module



Figure 2: Nano Module on the Carrier Board

There has been some confusion around the recommend pad placement for a carrier board designed to accommodate the Nano module due to some inconsistencies in our documentation.

This drawing from the current Nano Design Guide, intended to show how to design a 50 Ohm transmission line on a printed circuit board, contributed to the confusion.

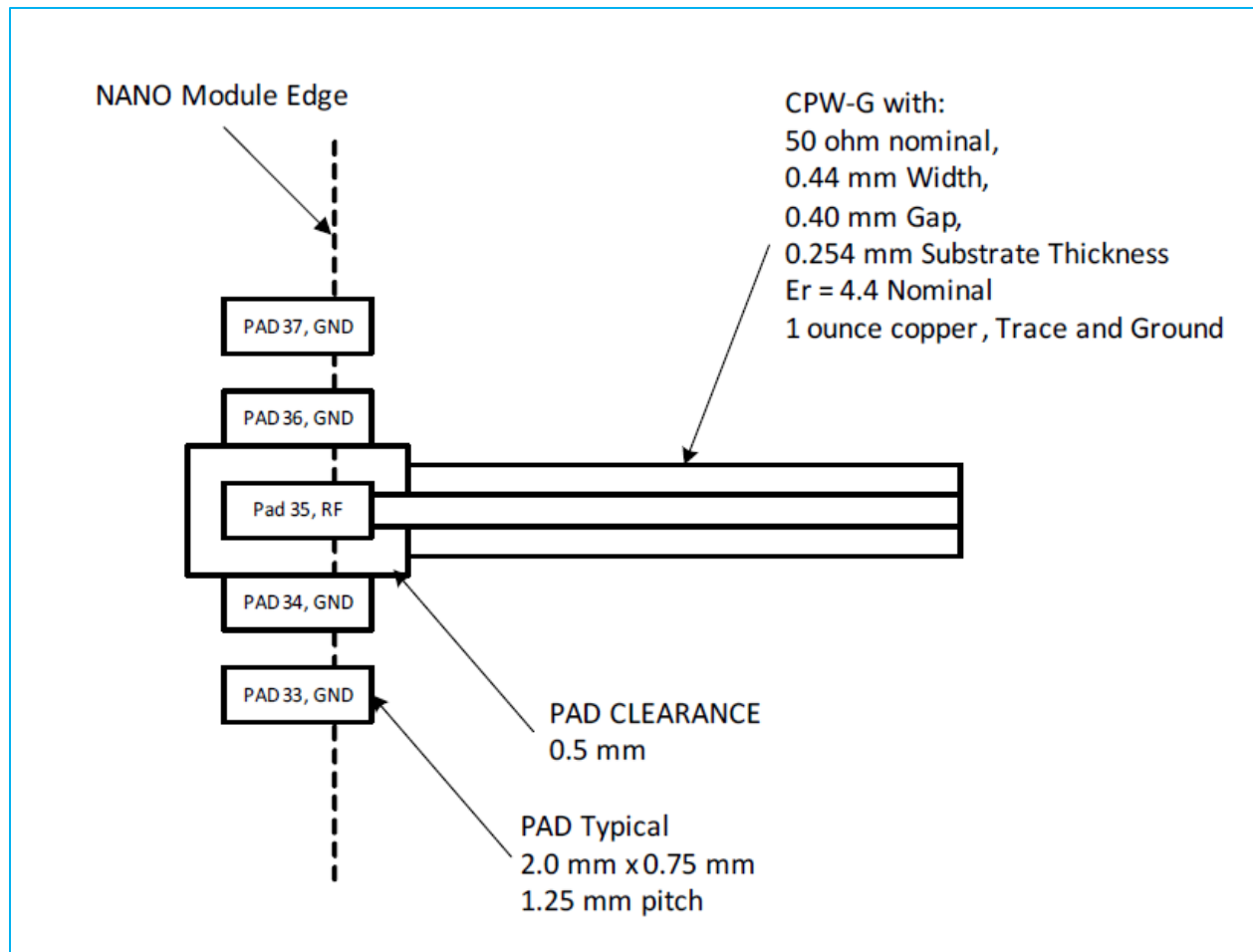


Figure 3: Original Advice in Nano Design Guide

When compared to the design files for the recommended carrier board (downloadable from the ThingMagic Support page), the following distinctions are apparent (in red):

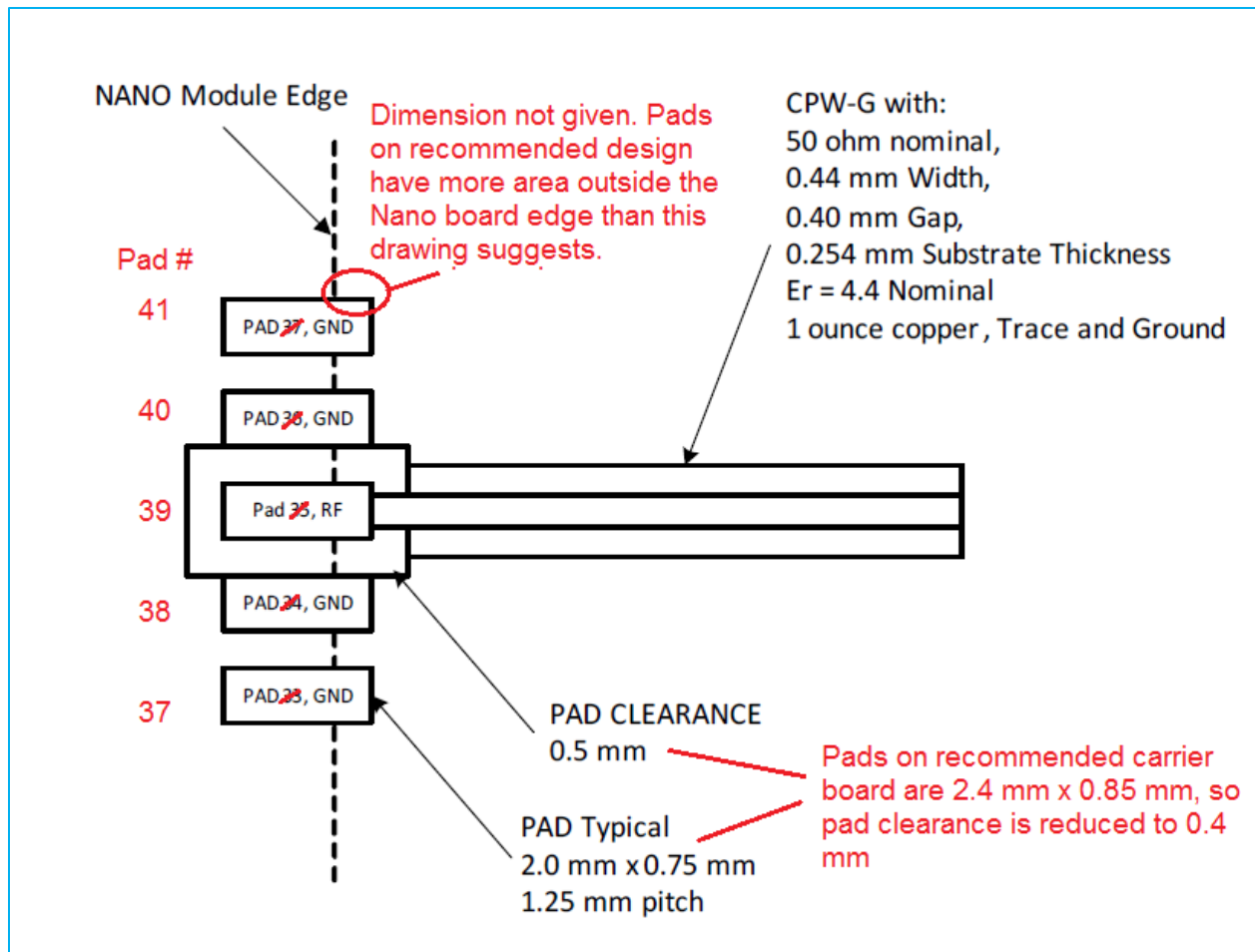


Figure 4: Annotated Advice from Original Nano Design Guide

Here is what the bottom copper of the NANO looks like (bottom of board as viewed from the top; areas without solder mask shown in yellow):

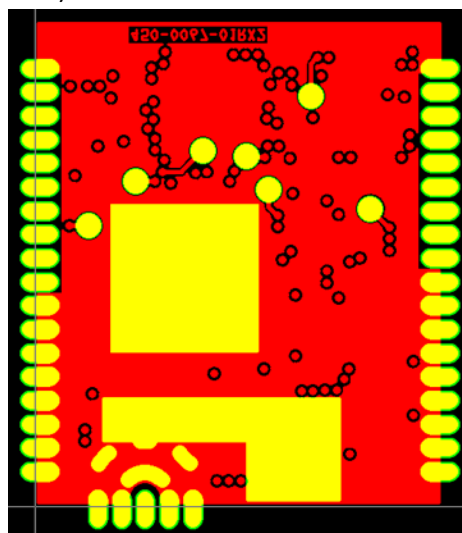


Figure 5: Bottom of Nano Module (Before Edge Pads Trimmed into Serrated Via's)

Here is what the Top side of the carrier board looks like (exposed copper areas without solder mask shown in light blue):

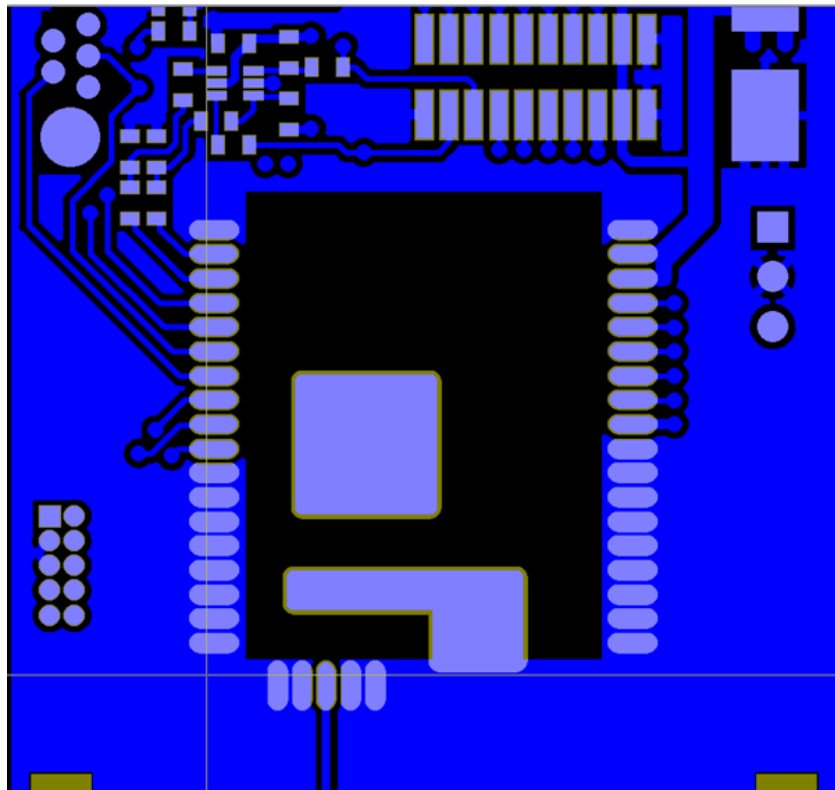


Figure 6: Recommended Carrier Board Pad Dimensions and Locations

This plot shows the Nano superimposed on the carrier board, showing how the pads align. The white areas show where the exposed copper of the Nano module meets the exposed copper of the carrier board.

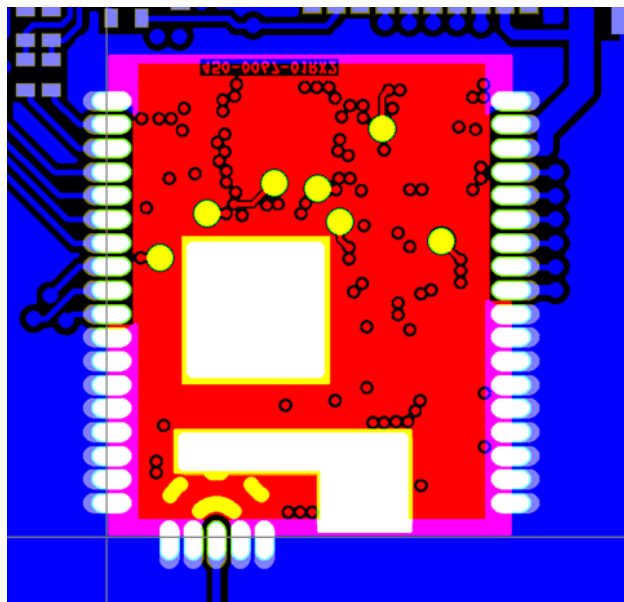


Figure 7: Nano on Carrier Board, showing Pad Alignment

When we zoom in at the RF port and the right-side power/control ports there is no overlap between the carrier board pads and the large ground area:

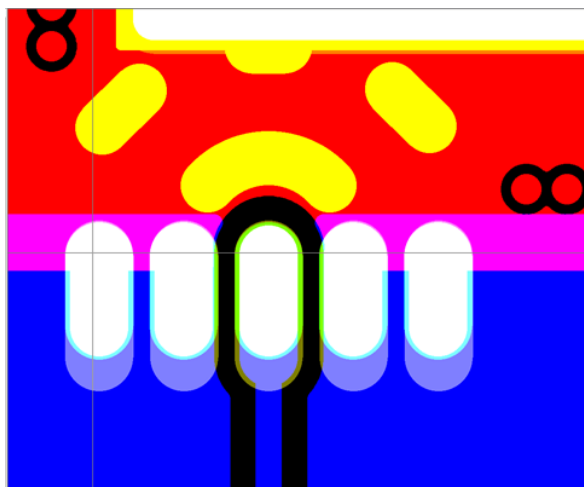


Figure 8: Close-up of RF Pads

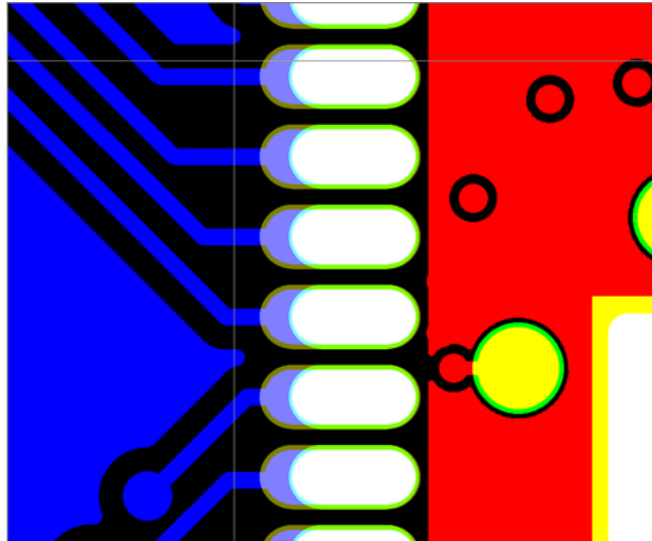


Figure 9: Close-up of Side Control/Power Pads

You can see that the carrier board pads are aligned with the Nano pads toward the module, but extend beyond the Nano pads away from the module. The carrier board pads are even more exposed than this after the slicing of the Nano pads (not shown) to form the serrated edges (see Figure 1: Nano Module).

Note that there are areas where the ground plane of the Nano (covered by solder mask) is closer than 0.4 mm to the side pads. This has not been a problem for our manufacturing process, but if you expect the Nano module to drift as much as 0.2 mm when it is soldered to your carrier board, you may find it desirable to trim the carrier board's pads a little in the direction of the ground plane to add more clearance.

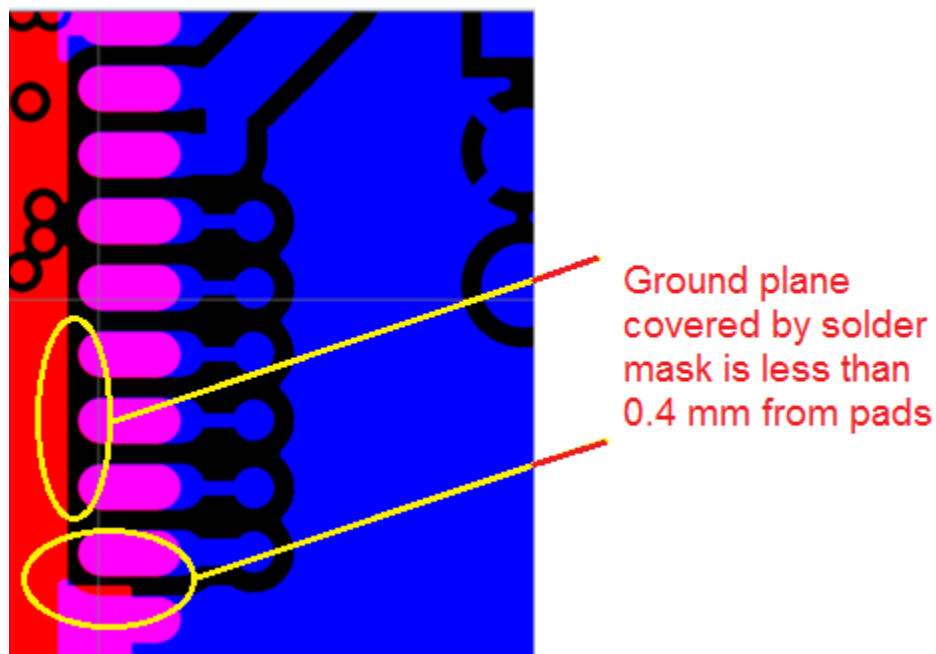


Figure 10: Areas of Minimal Clearance

For those who wish a table of pad locations rather than working off the Gerber files, it is provided below. The dimensions and locations are given according to the following conditions:

- Pad location origin is the center of Pad 1.
- Locations given for the other pads are their centers.
- All Pads are Oval with dimensions of 2.365 mm x 0.85 mm
- All dimensions are in mm.
- “Horizontal” and “Vertical” refer to the orientation in Figure 11, with “positive” being up and to the right.

The orientation is as if you were looking at the Carrier Board from the top side, as shown here)

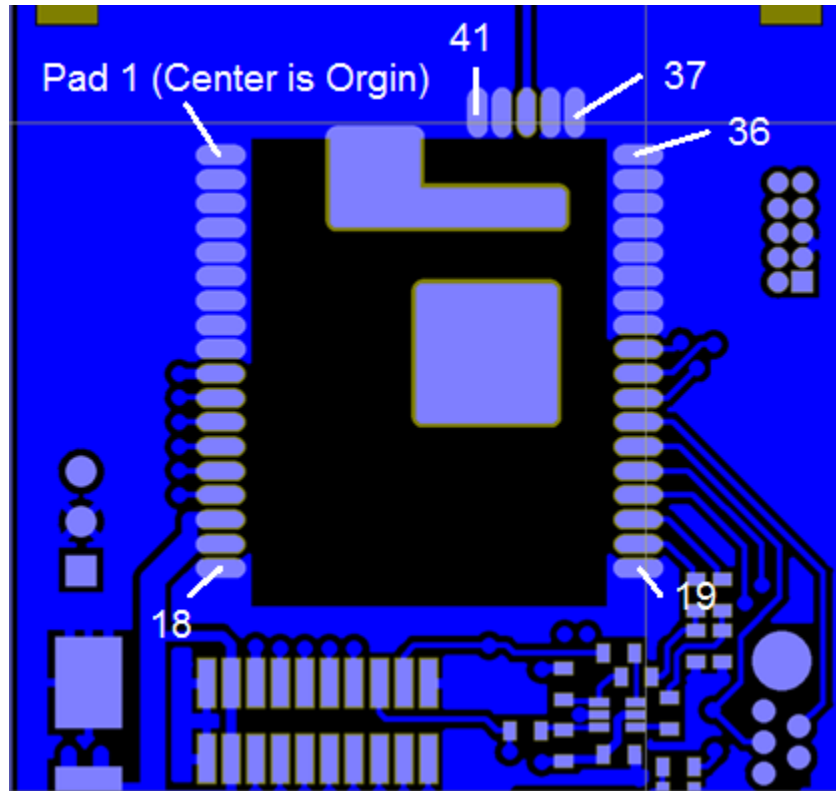


Figure 11: Pad definitions with respect to top of carrier board

Table 1: Recommended Carrier Board Pad Positions and Dimensions

Pad number	Pad Centers with Respect to pad 1	
	Horizontal	Vertical
1	0	0
2	0	-1.25
3	0	-2.5
4	0	-3.75
5	0	-5

Pad number	Pad Centers with Respect to pad 1	
	Horizontal	Vertical
6	0	-6.25
7	0	-7.5
8	0	-8.75
9	0	-10
10	0	-11.25
11	0	-12.5
12	0	-13.75
13	0	-15
14	0	-16.25
15	0	-17.5
16	0	-18.75
17	0	-20
18	0	-21.25
19	21.56	-21.25
20	21.56	-20
21	21.56	-18.75
22	21.56	-17.5
23	21.56	-16.25
24	21.56	-15
25	21.56	-13.75
26	21.56	-12.5
27	21.56	-11.25
28	21.56	-10
29	21.56	-8.75
30	21.56	-7.5
31	21.56	-6.25
32	21.56	-5
33	21.56	-3.75
34	21.56	-2.5
35	21.56	-1.25
36	21.56	0
37	18.28	2.22
38	17.03	2.22
39	15.78	2.22
40	14.53	2.22
41	13.28	2.22