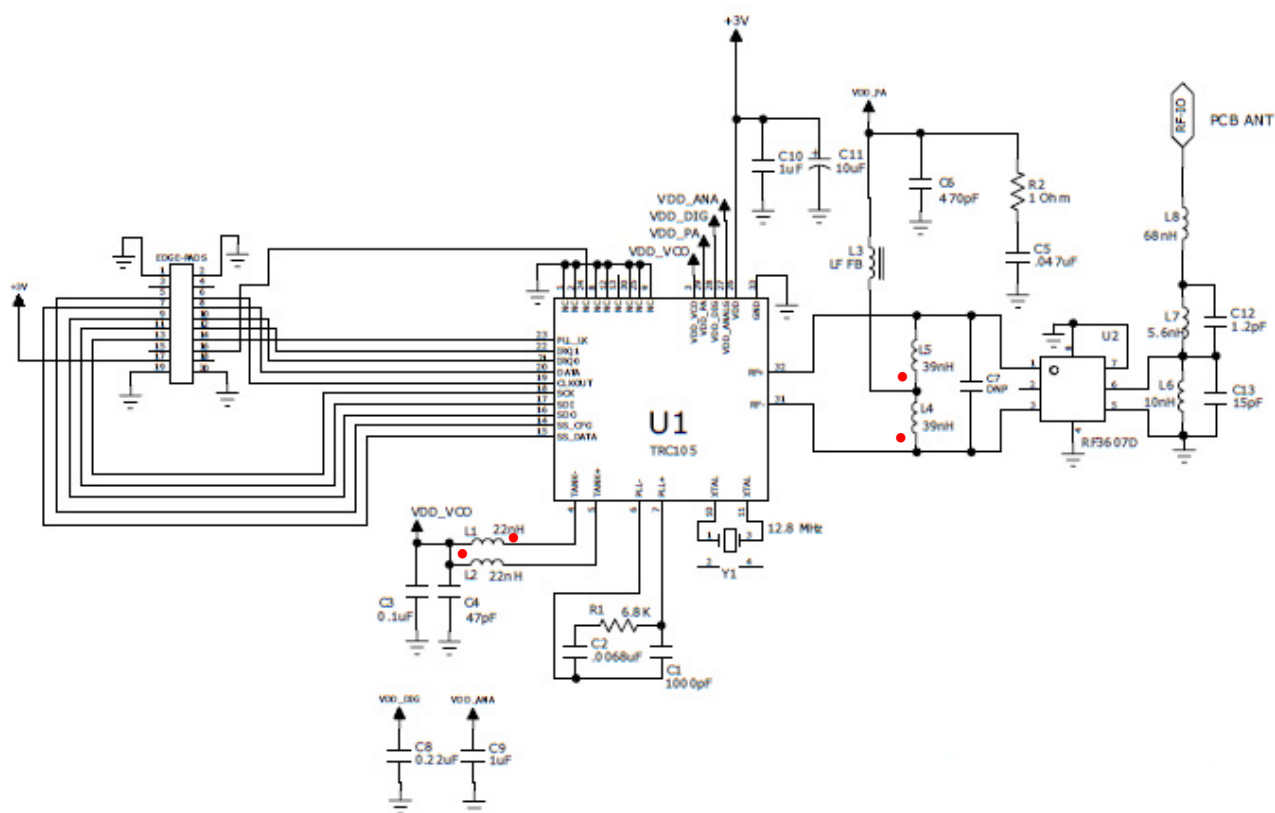


TRC105 403 MHz Transceiver Reference Design

Introduction

This application note presents a PCB reference design for Murata's TRC105 transceiver IC operating in the 403 MHz band. The reference design includes an integrated PCB antenna. The reference design schematic is shown in Figure 1 below.



Bill of Materials

The TRC105 403 MHz Reference Design BOM is presented below:

| | |
|-----|---|
| U1 | Murata TRC105 Transceiver IC |
| U2 | Murata RF3607D Low-loss SAW Filter |
| Y1 | Murata XTL1020 Crystal, 12.80000 MHz |
| L1 | 22 nH $\pm 5\%$, 0603 RF inductor |
| L2 | 22 nH $\pm 5\%$, 0603 RF inductor |
| L3 | RF Bead, 300 ohm, Fair Rite 2506033017Y0, 0603 |
| L4 | 39 nH $\pm 5\%$, 0603 RF inductor |
| L5 | 39 nH $\pm 5\%$, 0603 RF inductor |
| L6 | 10 nH $\pm 5\%$, 0603 RF inductor |
| L7 | 5.6 nH $\pm 5\%$, 0603 RF inductor |
| L8 | 68 nH $\pm 5\%$, 0603 RF inductor |
| C1 | 1,000 pF $\pm 5\%$, COG, 50 V, 0603 capacitor |
| C2 | 0.0068 μ F $\pm 10\%$, X7R, 50 V, 0603 capacitor |
| C3 | 0.1 μ F $\pm 10\%$, X5R, 50 V, 0603 capacitor |
| C4 | 47 pF $\pm 5\%$, COG, 50 V, 0603 capacitor |
| C5 | 0.047 μ F $\pm 10\%$, X7R, 50 V, 0603 capacitor |
| C6 | 470 pF $\pm 5\%$, COG, 50 V, 0603 capacitor |
| C7 | not used |
| C8 | 0.22 μ F $\pm 10\%$, X7R, 50 V, 0603 capacitor |
| C9 | 1 μ F $\pm 10\%$, X5R, 50 V, 0603 capacitor |
| C10 | 1 μ F $\pm 10\%$, X5R, 50 V, 0603 capacitor |
| C11 | 10 μ F $\pm 10\%$, Tantalum, 16 V, B case capacitor |
| C12 | 1.2 pF ± 0.25 pF, COG, 50 V, 0603 capacitor |
| C13 | 15 pF $\pm 5\%$, COG, 50 V, 0603 capacitor |
| R1 | 6.8K $\pm 5\%$, 0.1 W, 0603 film resistor |
| R2 | 1 ohm $\pm 5\%$, 0.1 W, 0603 film resistor |
| PCB | see http://wireless.murata.com/RFM/data/trc105_pcb.zip |

Circuit Board Layers

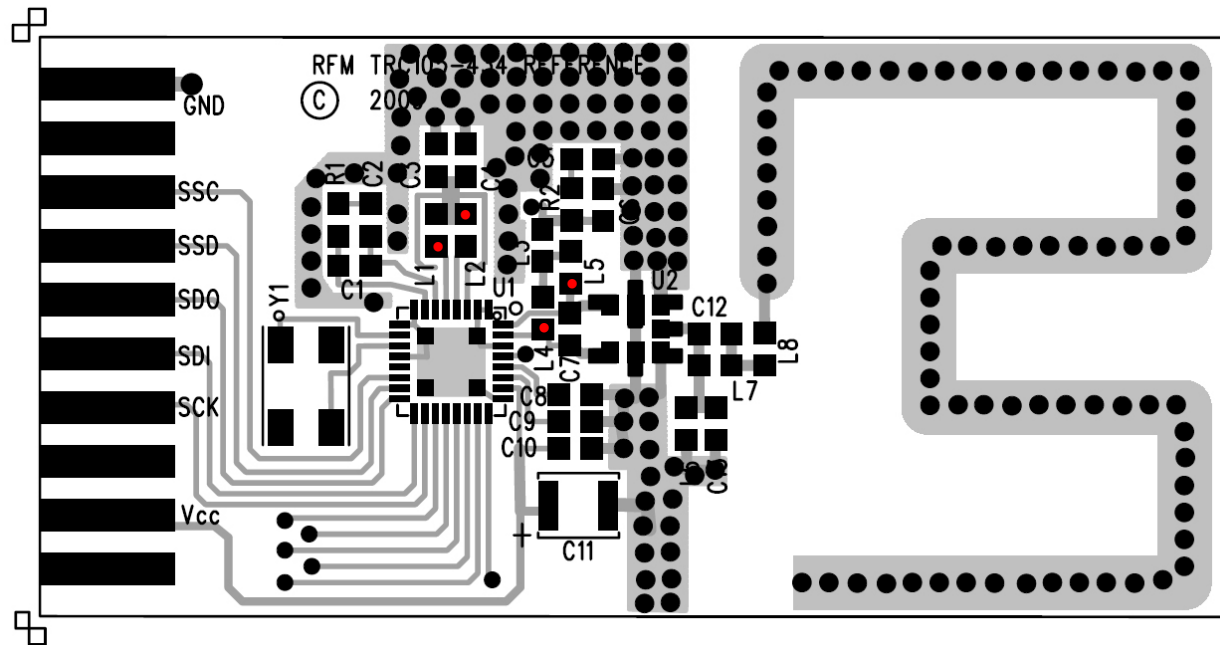


Figure 2 - Top Assembly

Figure 2 shows the TRC105 reference design top assembly. Power supply and digital I/O signals are organized on the left, the printed antenna is on the right. Note the dot (band) orientation of L1 with respect to L2, and the orientation of L4 with respect to L5. A wide variety of microcontrollers can be used to control the TRC105. PADS PCB design files and Gerber files of the reference design layout are available at http://wireless.murata.com/RFM/data/trc105_pcb.zip.

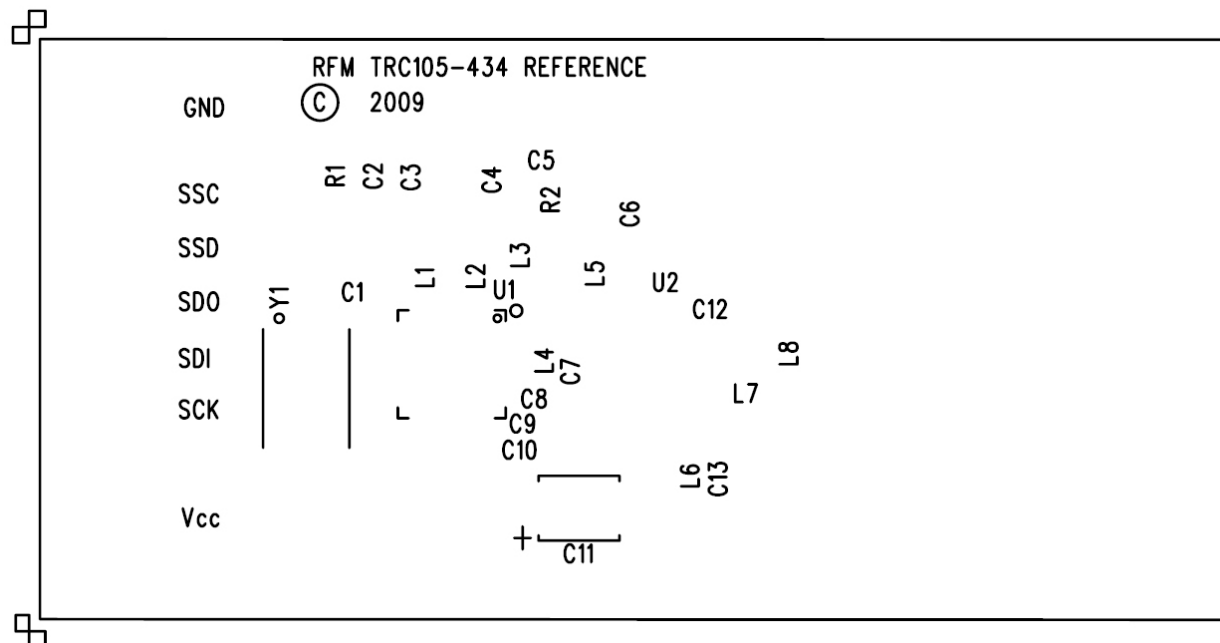


Figure 3 - Top Silkscreen

The top silkscreen is shown in Figure 3.

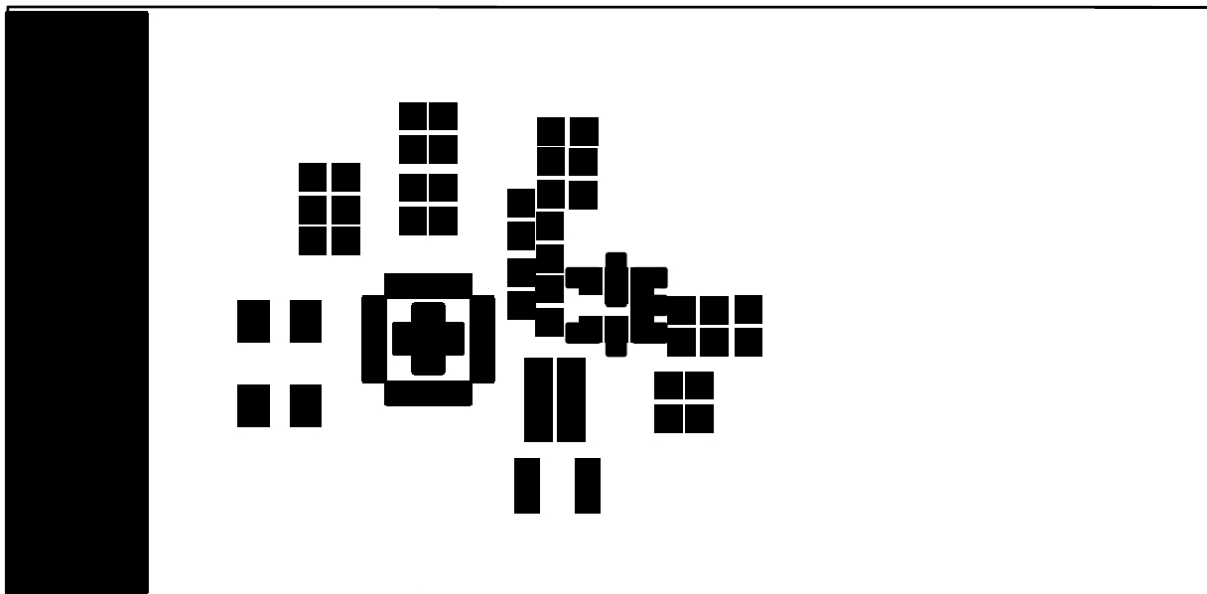


Figure 4 - Top Solder Mask

The top solder mask is shown in Figure 4.

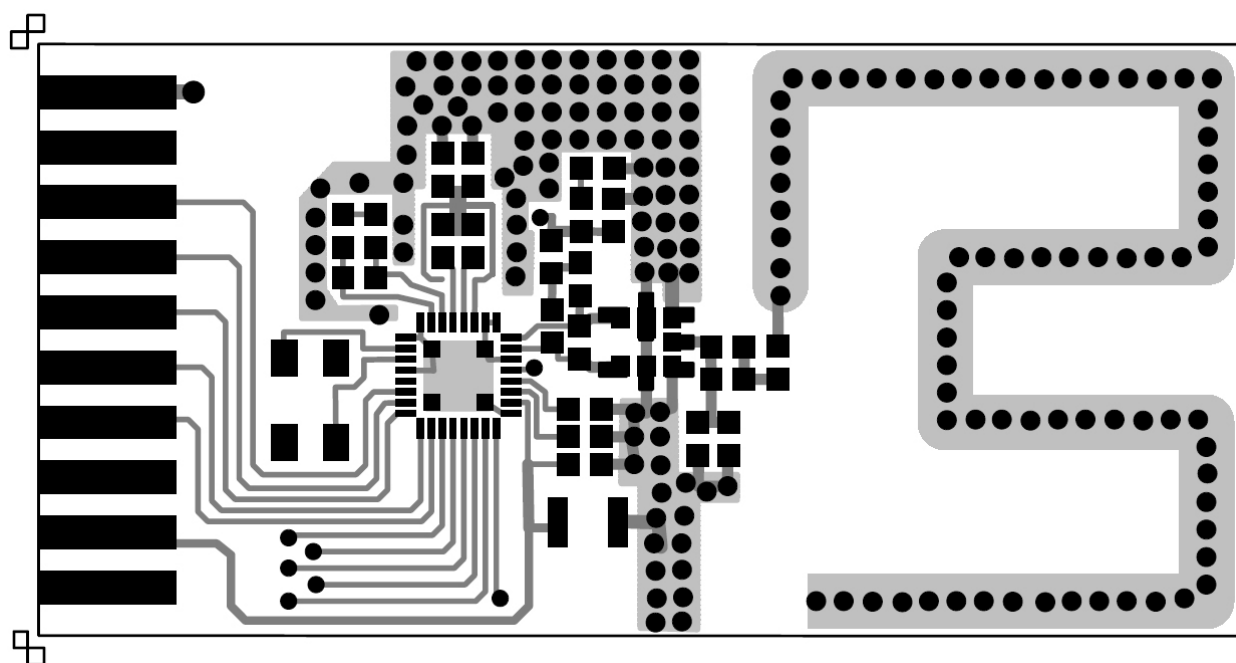


Figure 5 - Top Etch

The top etch pattern is shown in Figure 5. Using $\pm 5\%$ COG RF capacitors where specified in the bill of materials is important to reference design performance.

| SIZE | QTY | SYM | PLATED | TOL |
|------|-----|----------------|--------|----------|
| 10 | 182 | + | YES | +/-0.003 |
| 15 | 1 | + ^B | YES | +/-0.003 |

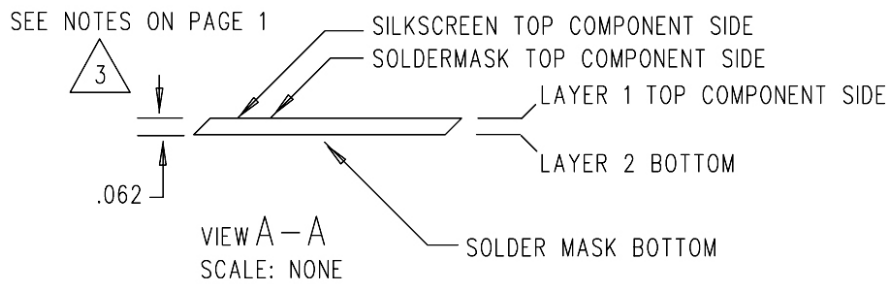
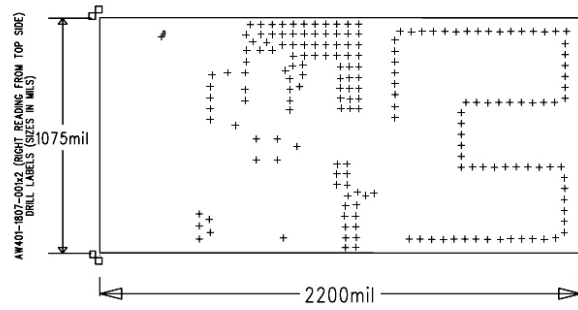


Figure 6 - Drill & Layer Data

The drill and layer data is provided in Figure 6. The reference design is implemented on a two-sided 0.031 inch board with 1 ounce copper traces.

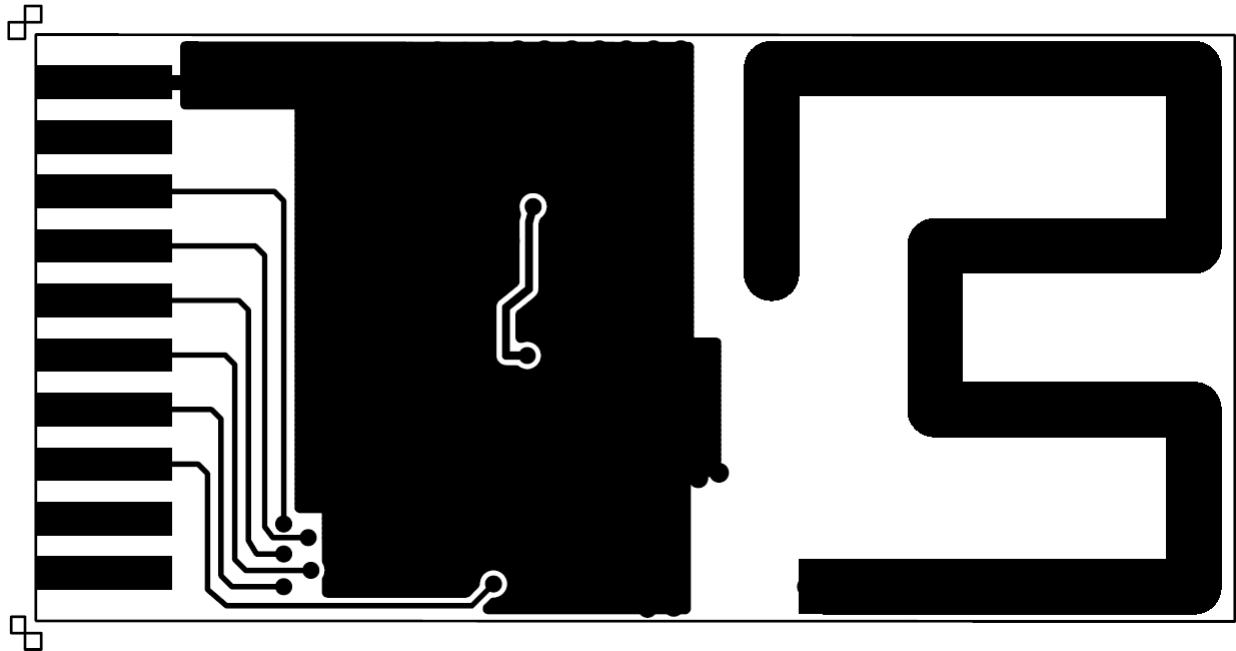


Figure 7 - Bottom Etch

Figure 7 shows the reference design bottom etch pattern.

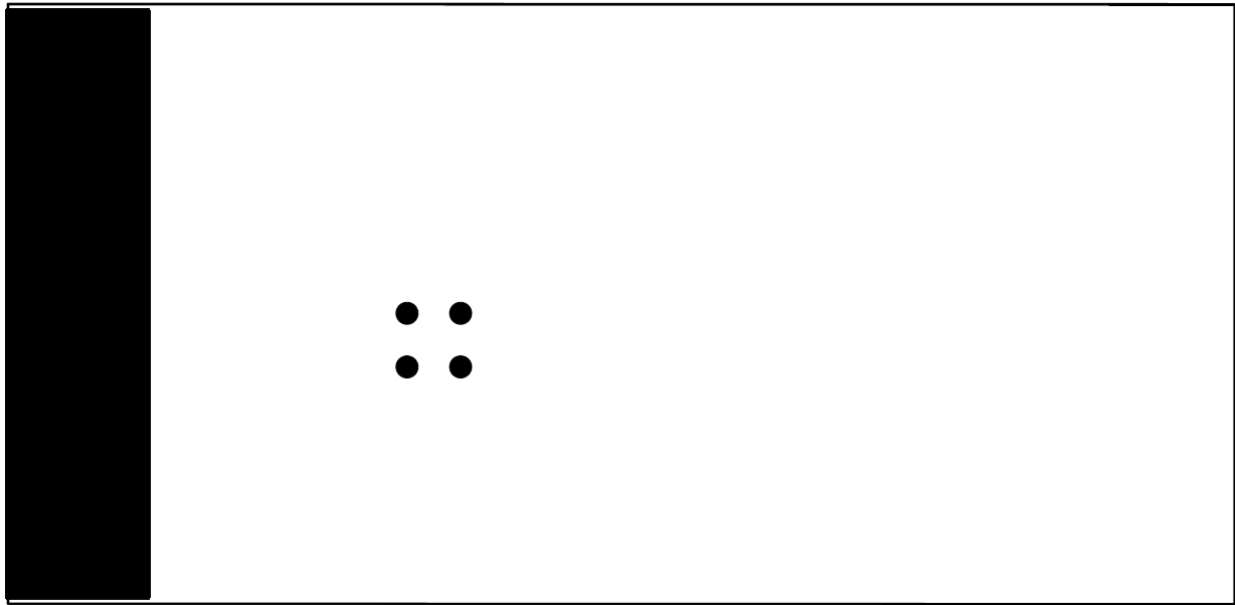


Figure 8 - Bottom Solder Mask

Figure 8 shows the reference design bottom solder mask.

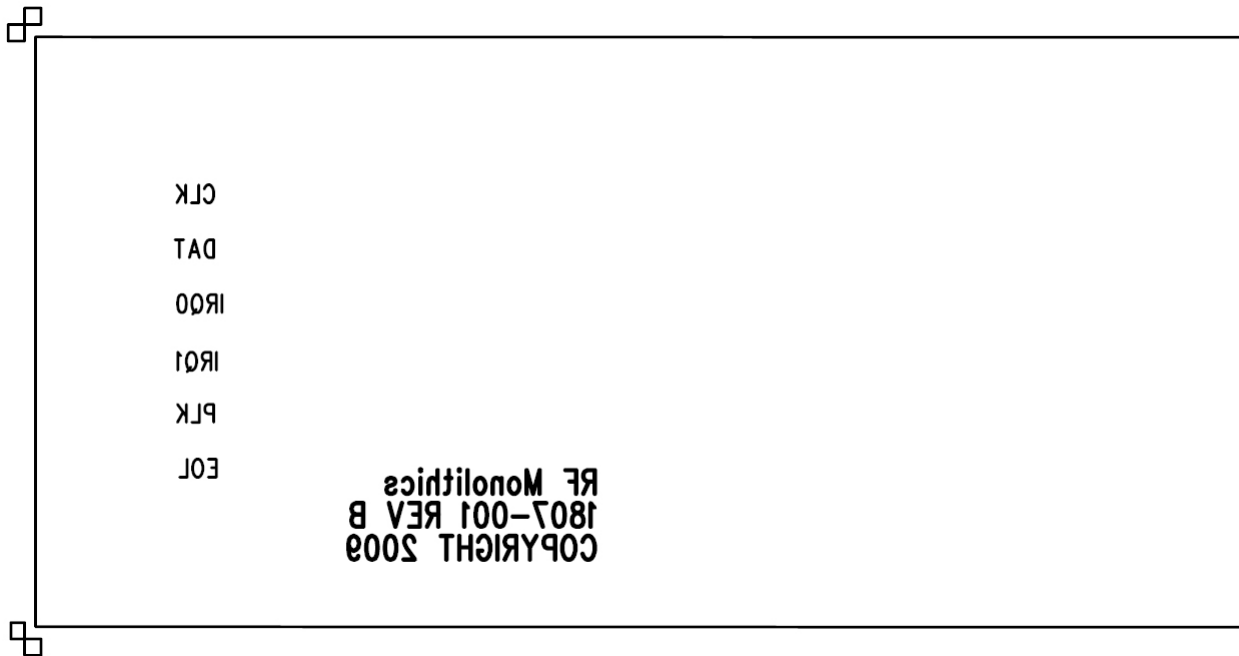


Figure 9 - Bottom Silkscreen

Figure 9 shows the bottom silkscreen.

Figure 10 shows the assembled TRC105 403 MHz reference design PCB.

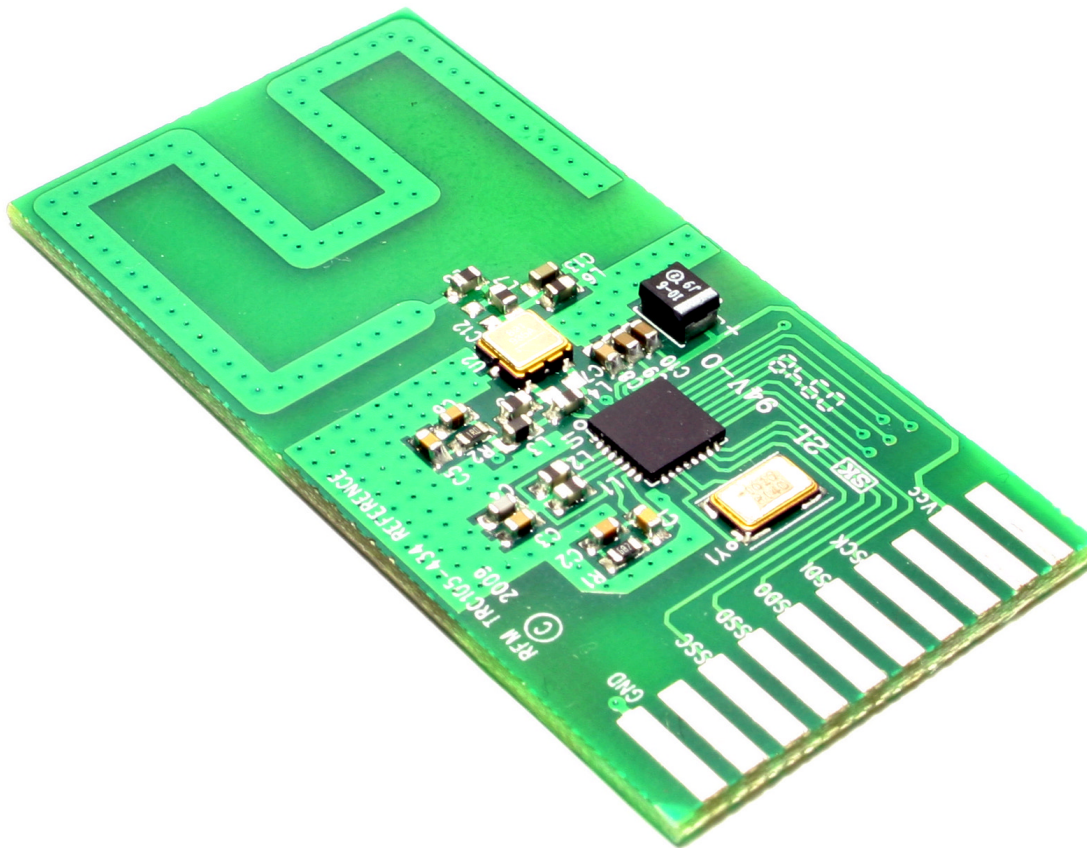


Figure 10 - Assembled Reference Design PCB