HONEYCOMB

HBT24B13AN
Data Sheet

Note the label artwork for Products

FCC ID : 2AAUWHBT24B13AN
This device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) This device must accept any interference received,
including interference that may cause undesired operation.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ☐ **Reorient or relocate the receiving antenna.**
- ☐ **Increase the separation between the equipment and receiver.**
- ☐ **Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.**
- ☐ **Consult the dealer or an experienced radio/TV technician for help.**

Note: This BT Module is designed to be used internally only in Controls products which with RF shielding. It is not intended to be sold as an end item by itself to external customers.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This module and its antenna(s) must not be co-located with any other transmitters except in accordance with FCC multi-transmitter product procedures.

The module is intended only for OEM integrator. And it should not be marketed and sold in a way that has to be end-user accessible / replaceable. The host product is required to comply with all applicable FCC equipment authorizations regulations, requirements and equipment functions not associated with the transmitter module portion. The host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational.

Label of the end product:
The final end product must be labeled in a visible area with the following "Contains Transmitter Module FCC ID: 2AAUWHBT24B13AN" or "Contains FCC ID: 2AAUWHBT24B13AN". If the size of the end product is larger than 8*10cm, then the following FCC Part 15.19 statement has to also be available on the label: This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

User manual of the end product:
In the user manual of the end product, the end user has to be informed that:
Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.   These limits are designed to provide reasonable protection against harmful interference in a residential installation.   This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.   If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

□   **Reorient or relocate the receiving antenna.**

□   **Increase the separation between the equipment and receiver.**

□   **Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.**

□   **Consult the dealer or an experienced radio/TV technician for help.**

If the size of the end product is smaller than 8*10cm, then additional FCC Part 15.19 statement is required to be available in the user manual: This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

BlueTooth 2.1+EDR Module

Features:

- On-chip TX/RX switch

- Small Size: 27mm*13mm Surface Mountable.

- Polar modulation transmitter architecture with very low power consumption high TX performance.

- Near-Zero IF receiver architecture with 91dBm sensitivity.

- Support for class 1, 2 and 3 transmitting power requirement.

- Fully integrated synthesizer without external loop filter component.

Operational:

- Operating Voltage: 3.2V to 4.3V(typical 3.3V)

- Temperature Range: -20°C to +70°C

- Simple, Four-Wire SPI Interface

BASEBAND

- Fully compliant with Bluetooth 2.1 + EDR specification.

- Support Bluetooth Piconet and Scatternet.

- Support up to 3Mbps high speed UART interface.

- Support Sniff mode, hold mode and park mode.

- Support A-law, µ-law and CVSD digitize audio CODEC in PCM interface

● Provide 4 wires SPI interface.

DEVICE

● Enhanced support for WLAN/BT Co-existence.

● Standby   and sleep modes to minimize power consumption.

● Support share handset system reference clock.

FIGURE 1: PIN DIAGRAM
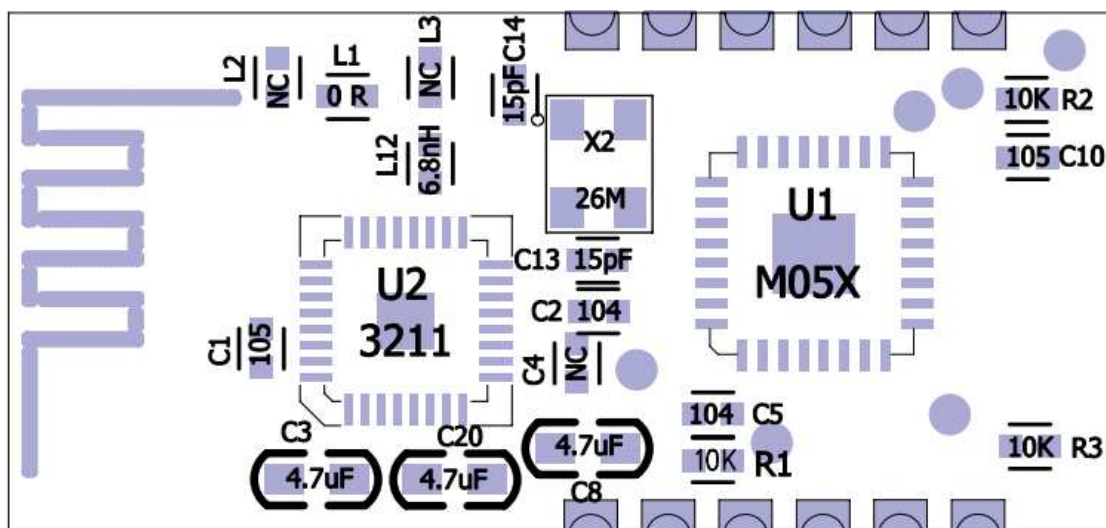
Device Overview

The BK3211 chip is a highly integrated single-chip Bluetooth device. It integrates the high-performance transceiver and rich features baseband processor, which is compliant with Bluetooth 2.1 + EDR specification
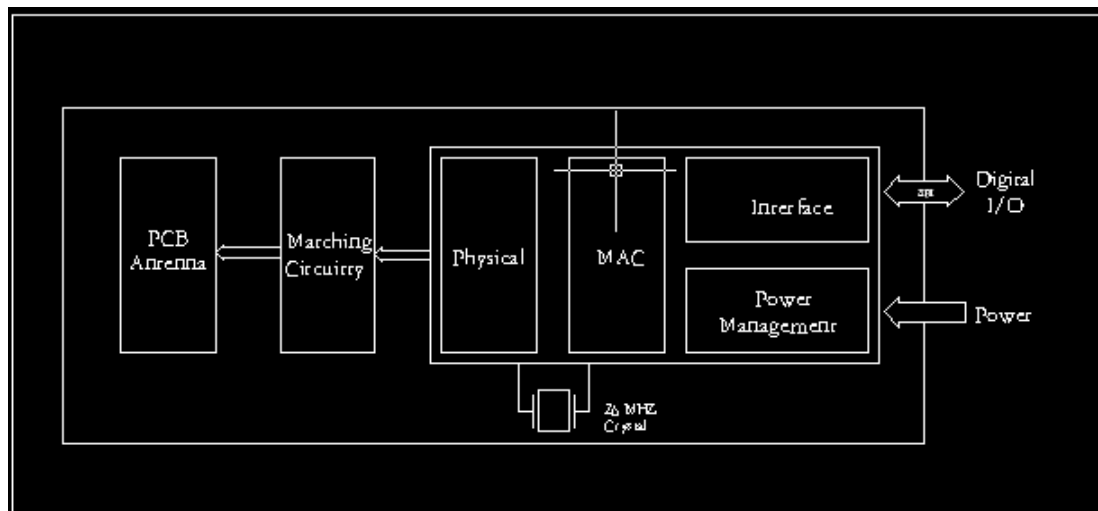
FIGURE 2: BLOCK DIAGRAM

TABLE 1-1: PIN DESCRIPTION

Pin	Symbol	Type	Description
1	GND	Ground	Ground
2	VDD	POWER	Positive Power
3	RST	DI	Global hardware reset pin, active low
4	STATE(RXD)	DO	Work Status Output
5	SELECT(TXD)	DO	Serial interface Data Output Request
6	INT(SEL)	DI	Serial interface Transmit Interrupt
7	GPIO0	DIO	Reserve
8	SPI_SS	DI	Serial interface enable
9	SPI_MOSI	DO	Serial Interface data Input
10	SPI_MISO	DI	Serial Interface data output
11	SPI_SCLK	DI	Serial interface clock
12	GPIO1	DIO	Reserve

Legend: Pin type abbreviation: D=Digital, I=Input, O=Output

FIGURE 3: MICROCONTROLLER TO HBT24B13AN INTERFACE
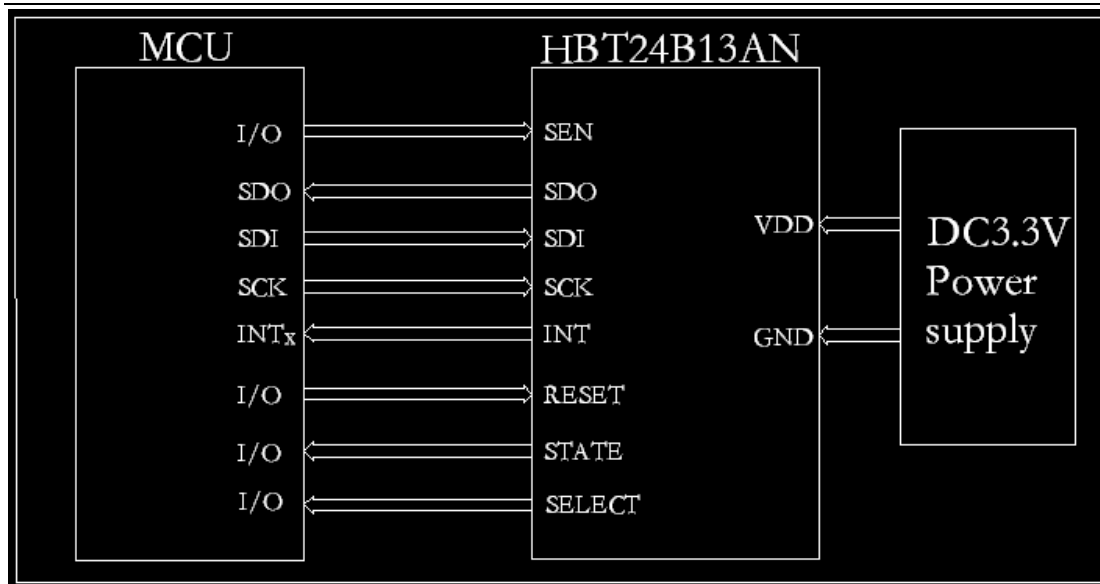
Mounting Details

The HBT24B13AN is a surface mountable module. Module dimensions are shown in Figure 4. The module Printed Circuit Board (PCB) is 0.032" thick with castellated mounting holes on the edge. Figure5 is a recommended host PCB footprint for the HBT24B13AN. The HBT24B13AN has an integrated PCB antenna. For the best performance, follow the mounting details shown in Figure 5. It is recommended that the module be mounted on the edge of the host PCB and an area around the antenna, approximately 1.2", be kept clear of metal objects. A host PCB ground plane around the HBT24B13AN acts as a counterpoise to the PCB antenna. It is recommended to extend the ground plane at least 0.4" around the module.
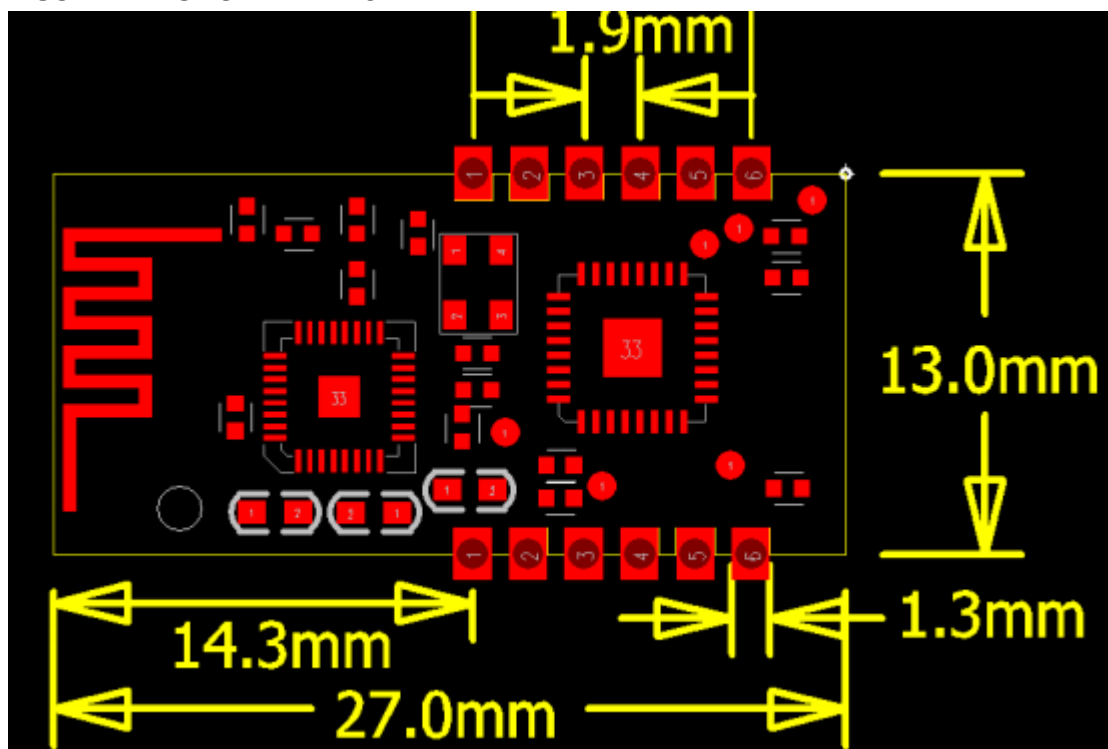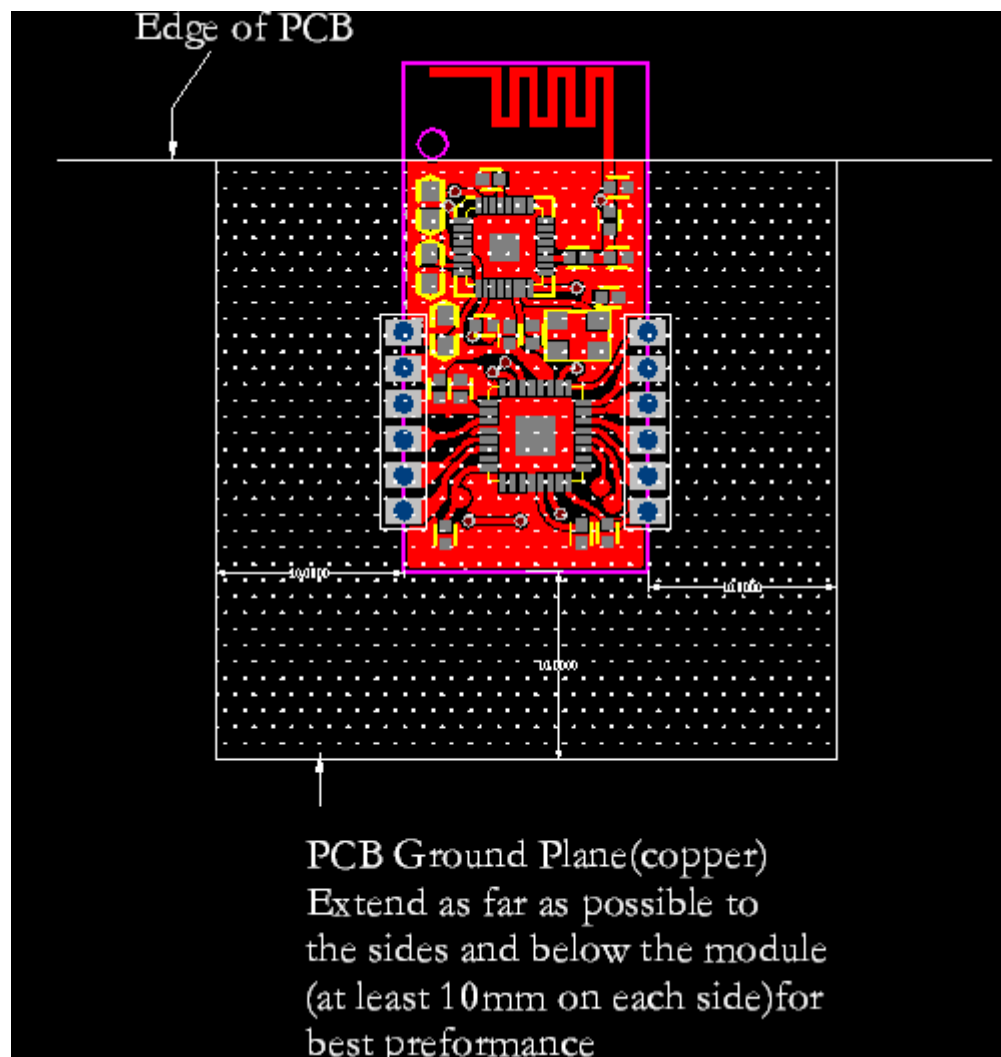
FIGURE 4: MODULE DETAILS

FIGURE 5 RECOMMENDED PCB FOOTPRINT

CIRCUIT DESCRIPTION

The HBT24B13AN module is a compliant with Bluetooth 2.1 + EDR surface mount module with integrated crystal, internal voltage regulator, matching circuitry and PCB antenna. The HBT24B13AN module interfaces to many popular micro-controllers via a 4-wire serial SPI interface, interrupt, wake, Reset, power and ground.

SCHEMATIC

A schematic diagram of the module is shown in Figure 6 and the Bill of Materials (BOM) is shown in Table 2. The HBT24B13AN module is based on the BK3211 chip is a highly integrated single-chip Bluetooth device. ceiver IC. The serial I/O (SCK, SDI, SDO and CS), RESET, STATE, SELECT and INT pins are brought out to the module pins. The SDO signal is tri-state buffered by IC2 to solve a silicon errata where the SDO signal does not release to a high-impedance state after the CS pin returns to its inactive state. Crystal Y1 is a 26 MHz crystal with a frequency tolerance of ±20 ppm @ 25°C to ±40 ppm.
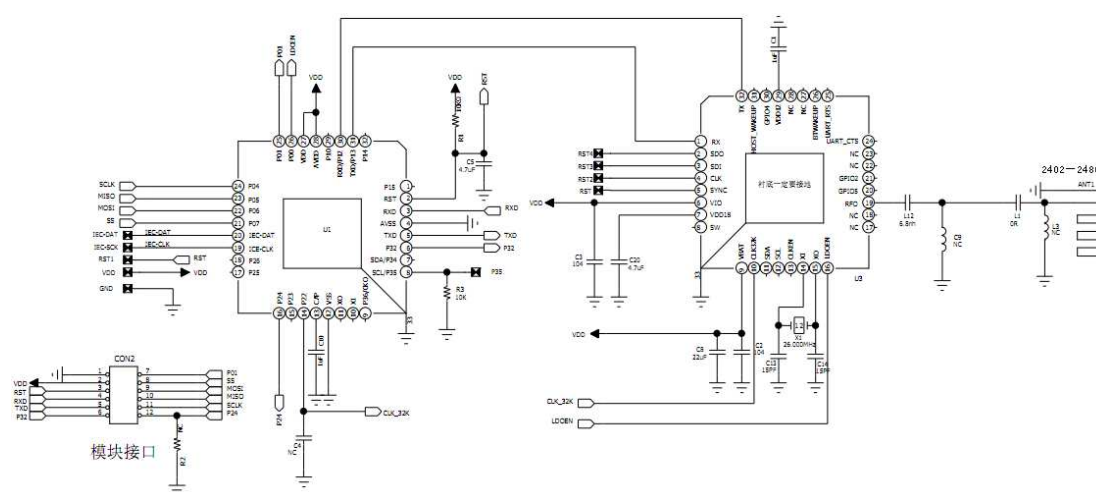
FIGURE 6 HBT24B13AN SCHEMATIC

TABLE 2 HBT24B13AN BILL OF MATERIALS

NUM	Position	Type	FootPrint	Attribute	
1	U1	IC	QFN32 5*5	Mini54ZAN	1
2	U2	IC	QFN32 4*4	BK3211	1
3	L12	Inductor	0402	6.8nH/±5%	1
4	C2 C5	Capacitor	0402	104/±20%	2
5	C1 C10		0402	105/±20%	2
7	C13 C14		0402	15pF/±5%	2
8	C3 C8 C20		0603	4.7uF/±20%	2
9	L1	Resistor	0402	0R/±5%	1
10	R1 R2 R3		0402	10K/±5%	3
12	X2	Crystal	3225	26MHZ/9pF/10PPM	1

Printed Circuit Board

The HBT24B13AN module printed circuit board is con-structed with FR4 material, two layers and 0.8mm thick. The layers are shown in Figure 7 through Figure 8. The stack up of the PCB is shown in Figure9
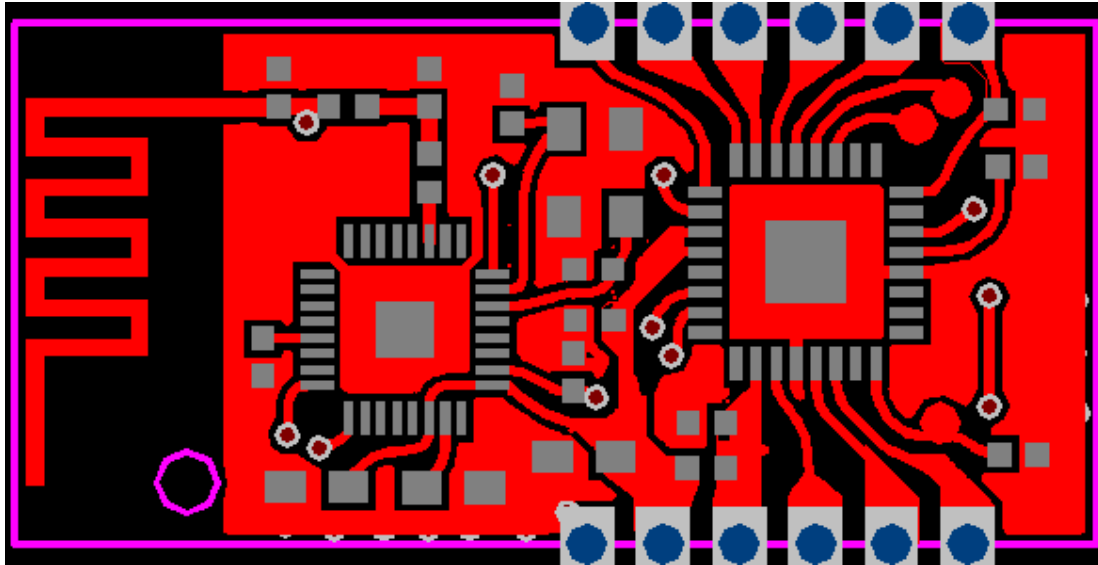
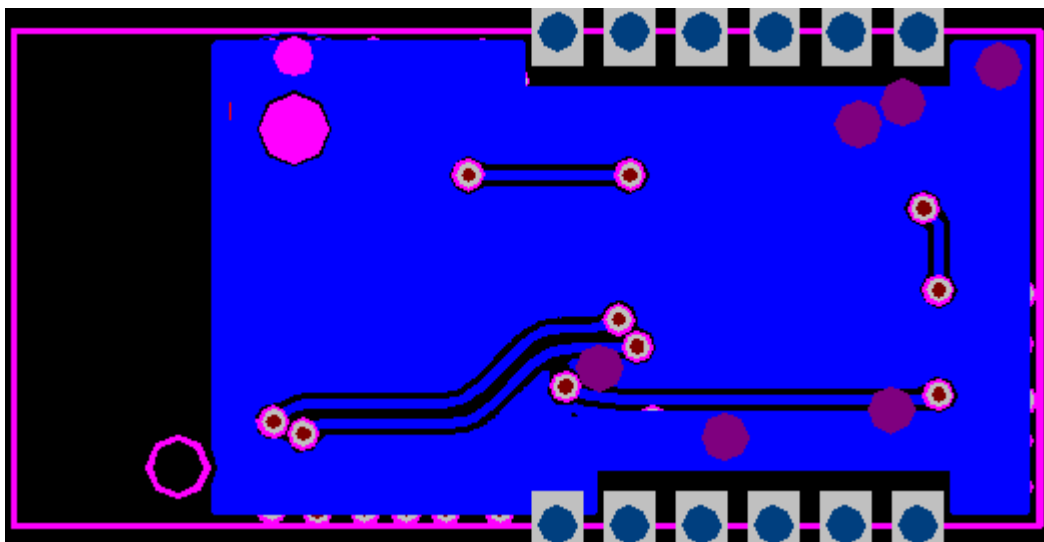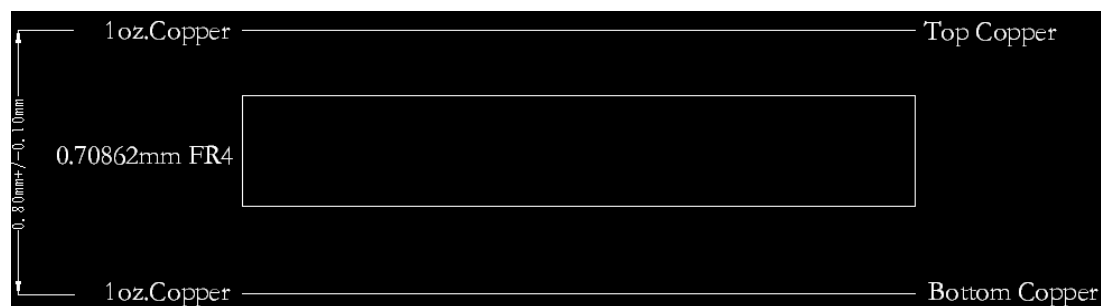**FIGURE 7 TOP COPPER**

FIGURE 8 BOTTOM COPPER

FIGURE 9 PCB LAYER STACK UP

PCB Antenna

The PCB antenna is fabricated on the top copper trace. Figure 10 shows the trace dimensions. The layers below the antenna have no copper traces. The ground and power planes under the components serve as a counterpoise to the PCB antenna. Additional ground plane on the host PCB will substantially enhance the performance of the module.

FIGURE 10 PCB LAYER STACK UP