

Precision RC Electronics Inc.,

2.4GHz RF MODUL(#MPH-2520)

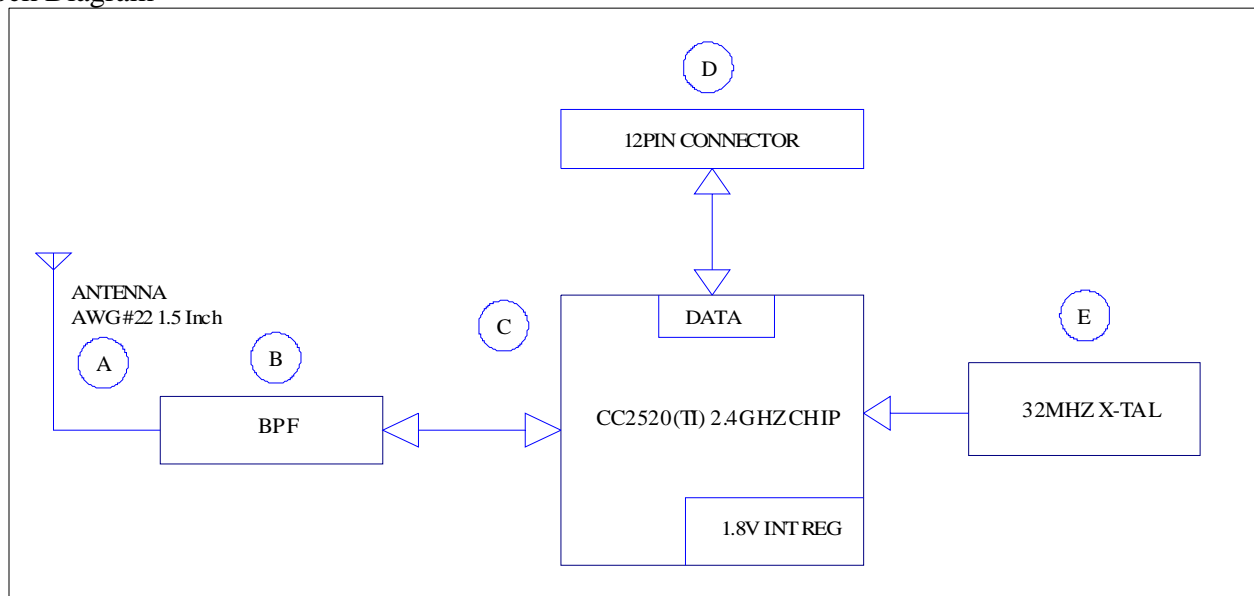
Operating User's Manual

**Description:**

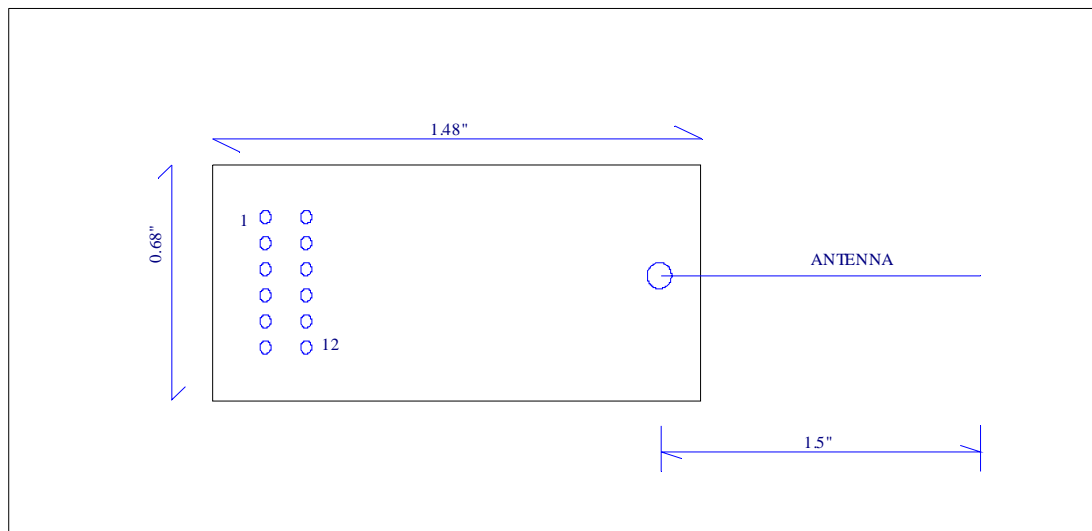
The CC2520 is TI's second generation ZigBee® IEEE 802.15.4 RF transceiver for the 2.4 GHz unlicensed ISM band. This chip enables industrial grade applications by offering state-of-the-art selectivity/co-existence, excellent link budget, operation up to 125°C and low voltage operation. In addition, the CC2520 provides extensive hardware support for frame handling, data buffering, burst transmissions, data encryption, data authentication, clear channel assessment, link quality indication and frame timing information.

**Key Features:**

State-of-the-art selectivity/co-existence  
Adjacent channel rejection: 49 dB  
Alternate channel rejection: 54 dB  
Excellent link budget (103dB)  
400 m Line-of-sight range  
Extended temp range (-40 to +125°C)  
Wide supply range: 1.8 V – 3.8 V  
Extensive IEEE 802.15.4 MAC hardware support to offload the micro-controller  
AES-128 security module  
Low Power  
RX (receiving frame, -50 dBm) 18.5 mA  
TX 33.6 mA @ +5 dBm  
TX 25.8 mA @ 0 dBm  
<1µA in power down

**1,Block Diagram**

## 2,PCB Layout



## 3.PINOUT

PIN #	Signal Out	Description
1	VDD	+3.3V DC
2	GND	Power Ground
3	VREG_EN	Internal 1.8V regulator Enable
4	RESETn	System Reset
5	GP3	General IO
6	Csn	SPI select signal
7	GP1	General IO
8	GP2	General IO
9	SCK	SPI CLOCK
10	GP0	General IO
11	MOSI	SPI MOSI
12	MISO	SPI MISO

## 4, Serial Peripheral Interface (SPI)

The SPI provides an interface for giving instructions to the CC2520 and transferring data between CC2520 and a micro-controller. The CC2520 4-wire slave interface consists of three input signals (CSn, SCLK and SI) and one output signal (SO). All instructions available via the SPI interface are listed and described. The instructions are byte oriented and required bytes sent over the interface to CC2520 vary from 1 and up. To transfer one byte CSn must be pulled low and SCLK must complete 8 periods starting with a positive edge. There are no requirements to maximum period for SCLK or that it needs to be continuous. As long as CSn is held low, SCLK can be halted at any time and started again when desired.

## 5, GPIO

RF Module has 4 GPIO pins that can be individually configured as inputs, outputs and activate pull-up resistors. Each GPIO has an associated register, GPIOCTRLn, where the MSB configure the pin to either input or output. The GPIOCTRL register control pull-up for each individual GPIO pin, extra drive strength for all pins and analog function for pin 0 and 1. See section 30 for details about test functionality and observability through GPIO.

## 6,Power Modes

CC2520 has three power modes as described below. In all these power modes the supply voltage is applied to the circuit.

In **Low Power Mode 2** (LPM2) the digital voltage regulator is turned off (VREG\_EN=0) and no clocks are running. No data is retained. All analog modules are in power down state.

In **Low Power Mode 1** (LPM1) the digital voltage regulator is on (VREG\_EN=1), but no clocks are running. Data is retained. The power down signals to the analog modules are controlled by the digital part.

In **Active mode** the digital voltage regulator is on (VREG\_EN=1) and the crystal oscillator clock is running. The power down signals to the analog modules are controlled by the digital part.

## 7,Power Up With SRES

If one prefers to use the SRES command strobe to reset the device after powering up, the CSn signal must be set low and SRES must be issued after the internal regulator has stabilized. Until the SRES command strobe has been issued, the chip will be in an unknown state. Note that this means it could theoretically for instance be transmitting.

The time from power is applied to the XOSC has started depends on the clock frequency used on the SPI (max 8MHz) and the start-up time for the crystal.

Note that the crystal oscillator does not necessarily start automatically when the SRES command strobe is issued. That means one also has to issue an SXOSCON command strobe to be sure that the oscillator starts. Unlike the RESETn pin, the SRES command strobe will not influence the state of the crystal oscillator, so if the oscillator accidentally comes up in the "off" state, issuing a SRES will not make it start.

## 8,Absolute Maximum Ratings

over operating free-air temperature range unless otherwise noted

Supply voltage -0.3 to 3.9 V

Voltage on any digital pin -0.3 to VDD + 0.3 (Max 3.9) V

Voltage on 1.8 V pins -0.3 to 2.0 V

Input RF level +10 dBm

Storage temperature range -50 to 150 °C

Reflow soldering temperature 260 °C

ESD HBM 800 V

ESD CDM 500 V

ESD MM 100 V

More information, Please refer CC2520 Data sheet.([www.ti.com](http://www.ti.com))

## 9, FRQUENCY TABLE

CH #	Frequency(GHz)
12	2.41000
13	2.41500
14	2.42000
15	2.42500
16	2.43000
17	2.43500
18	2.44000
19	2.44500
20	2.45000
21	2.45500
22	2.46000
23	2.46500
24	2.47000
25	2.47500
26	2.48000

## **Regulatory Statements to be included in the Users Guide for Sputnik**

### **USA-Federal Communications Commission (FCC)**

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.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of 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. If not installed and used in accordance with the instructions, it 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 tuning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

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

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

### **Caution: Exposure to Radio Frequency Radiation.**

To comply with FCC RF exposure compliance requirements, for mobile configurations, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.

This device must not be co-located or operating in conjunction with any other antenna or transmitter.