



USER MANUAL

Module CCA-SA-W2500-02

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1. Overview

This document describes the operation and usage of the CCA-SA-W2500-02 Module. The Module is designed to operate in the 2.4 GHz ISM band and consume low power. It performs the functions of RF transmission, motion detection, and two way communications with the user through a push-button and an LED. Other capabilities are also provided by the MSP430 Microcontroller and CC2500 RF Transceiver. The following paragraphs describe the electrical connections as well as internal connections of the Module

2. Features

The CCA-SA-W2500-02 Module contains the following major features:

- TI Low Power MSP430 Mixed Signal Processor
- TI Low Power CC2500 2.4 GHz Transceiver with chip antenna
- SignalQuest SQ-SEN-200-I Motion Sensor with hardware filtering
- Tactile push button switch for user feedback
- Red LED for user notification

3. External Connections

3.1 Programming Port

The CCA-SA-W2500-02 Module is a programmable device controlled by an on-board Texas Instruments (TI) Low Power MSP430 Mixed Signal Processor. Connector J1 on the Module provides access for programming the unit and for external communications. Table 1 describes the function of each of the six (6) pins of J1.

Table 1: Module Programming Connections

Pin Number	Direction	Description
1 (GND)	n/a	Ground
2 (TX)	Output	Transmit Data
3 (RX)	Input	Receive Data
4 (RST/SBWTIO)	Both	Reset/Spi-by-wire Test Data I/O
5 (SBWTCK)	Input	Spi-by-wire Test Clock
6 (VCC)	n/a	Power

3.2 Power Source Connections

The Module operates from an external supply of +3VDC power. This power is provided by a battery. Table 2 describes the power and ground connections to the Module.

Table 2: Module Power Connections

Pin Name	Direction	Description
BC1-1 (VCC)	n/a	Power
BC1-2 (VCC)	n/a	Power
BC2-1 (GND)	n/a	Ground
BC2-2 (GND)	n/a	Ground

4. Powering the Module

Refer to the MSP430 and CC2500 Specifications Documents for the recommended and absolute ratings for supply voltages and input/output voltage levels.

IMPORTANT NOTE: Different power sources should never be connected to pin 6 of J1 and BC1-1 or BC1-2 simultaneously as these are directly connected within the Module.

5. Programming the Module

Programming the Module may be done using the Spi-by-wire interface. This is done through pins 4 and 5 of J1 which provide direct connection to the SBWTCK and SBWTDIO I/O pins on the MSP430 Microcontroller.

6. Transmitting/ Receiving over the air

RF transmission and reception is done using the CC2500 RF Transceiver which is controlled by the MSP430 Microcontroller using the SPI interface on I/O pins P3.0, P3.1, P3.2 and P3.3. The CC2500 also has two general I/O pins (GDO0 and GDO2) that may be set or read from on I/O pins P2.6 and P2.7 of the MSP430 respectively. Further details on using the GDO general I/O pins and necessary SPI settings and commands can be found in the CC2500 Specification Document. Information on using the SPI can be found in the MSP430 User Guide.

NOTE: The CC2500 oscillator input is connected to a 26 MHz crystal so the Transceiver should be configured accordingly.

7. Transmitting through the UART

The MSP430 Microcontroller contains an on-board UART which is accessible through I/O pins P3.4 and P3.5. This interface may be used to communicate outside of the module through a direct electrical connection made to pins 2 and 3 on J1. Pin 2 on J1 has a direct connection to P3.4 for transmit (T_X) and pin 3 has a direct connection to P3.5 for receive (R_X).

8. Using the LED

The Module's red LED can be controlled using I/O pin P1.0 of the MSP430. This output should be set low when the LED is to be off or not in use. In order to turn on the LED it should be set high.

9. Using the Push-Button Switch

The Module's tactile push button switch is connected to I/O pin P1.2 of the MSP430. In order to sense a button press, this I/O pin must be set as an input pin with its pull-up enabled. The logic level on this pin will be high when the button is not pressed, and becomes low when it is pressed.

10. Motion Detection

The Module's Motion Detector is used with I/O pin P2.2 of the MSP430. This pin must be set as an input with no pull-ups or pull-downs enabled. During the absence of motion this input will be low, while any light motion will cause it to go high. This input is filtered externally in order to reduce the number of motion alarms when the Module is moved continuously.

11. Other Considerations

I/O pins P2.3 and P2.4 of the MSP430 are directly connected to ground and must be set to input with pull-up disabled.

12. FCC Certification

Integrators Responsibility:

- 1) The CCA-SA-W2500-02 Module complies with Part 15 of the FCC rules and regulations. The CCA-SA-W2500-02 Module has a Limited Module Approval and should not be changed without recertification.
- 2) The MPE calculations need to be checked based on the location of the unit with reference to the user. See applicable FCC guidelines governing MPE and SAR testing.
- 3) To fulfill FCC Certification requirements the integrator must ensure that FCC labeling requirements are met. This includes a clearly visible label on the outside of the end product that states:

“This product contains FCC ID: XAYW2500

The Enclosed 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.”

- 4) All applicable FCC warnings need to be in the end user’s manual.

FCC Regulatory Information:

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:

- a) Re-orient or relocate the receiving antenna
- b) Increase the separation between the equipment and receiver
- c) Connect equipment and receiver to outlets on different circuits
- d) Consult the dealer or an experienced radio/TV technician for help.