User Guide
2014

CC3100BOOST (CC3100 Booster Pack) User Guide, Ver 1.1

ECS Applications

ABSTRACT

This document describes the CC3100BOOST (CC3100 Booster Pack). It details the features of the hardware and also explains the correct usage of the board.

FCC/IC Regulatory Compliance
FCC Part 15 Class A Compliant
IC ICES-003 Class A Compliant

The antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter

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1 Introduction

This document provides a quick start guide on using the CC3100 Booster Pack Rev 2.0B .

This is not applicable to other revisions of the board.

2 Overview

The CC3100 Booster Pack is a board designed to interface with the TI standard Launchpad including the Tiva-C series and the MSP430 value line launchpads. In addition to the launchpads, there is support available to mate the board with a FTDI Debug board to interface directly to a PC host using USB cable. A picture of the board is presented below with the main components marked.

3 Hardware description

3.1 Board overview

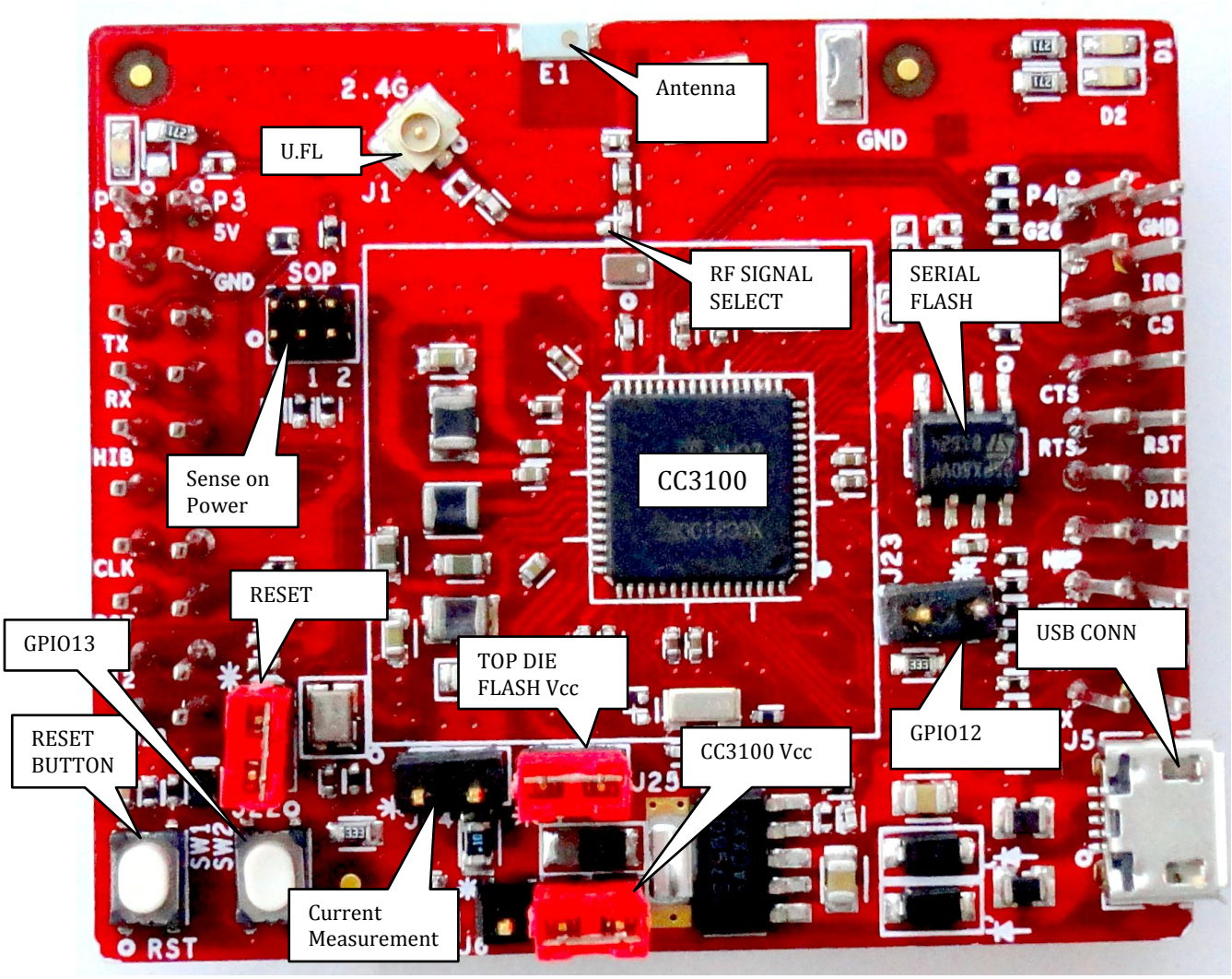


FIGURE 1 : HARDWARE DETAILS

3.2 Board features

- 2x20 pin stackable connectors
- On-board chip antenna with option for U.FL based conducted testing.
- Power from on-board LDO using USB **OR** 3.3V from MCU Launchpad
- Push buttons (2x)
- LEDs (4x)
- Jumper with 0.1 Ohm resistor for current measurement.
- .8 Mbit serial flash
- 40 MHz crystal , 32KHz crystal and oscillator.

- 4 Layer PCB with 6mil spacing and track width.
-

3.3 Jumper and connector information

3.3.1 2x20 pin connector

The signal assignment on the 2x20 pin connector is shown below. The convention of J1..J4 is replaced with P1…P4 to avoid confusion with the actual board reference.

Outer row connectors

Pin No	Signal Name	Direction
P1.1	VCC(3.3V)	IN
P1.2	UN-USED	NA
P1.3	UART1_TX	OUT
P1.4	UART1_RX	IN
P1.5	nHIB	IN
P1.6	UNUSED	NA
P1.7	SPI_CLK	IN
P1.8	UN-USED	NA
P1.9	UN-USED	NA
P1.10	UN-USED	NA

Pin No	Signal Name	Direction
P2.1	GND	IN
P2.2	IRQ	OUT
P2.3	SPI_CS	IN
P2.4	UN-USED	NA
P2.5	nRESET	IN
P2.6	SPI_MOSI	IN
P2.7	SPI_MISO	OUT
P2.8	UN-USED	NA
P2.9	UN-USED	NA
P2.10	UN-USED	NA

Inner row connectors

Pin No	Signal Name	Direction
P3.1	+5V	IN
P3.2	GND	IN
P3.3	UN-USED	NA
P3.4	UN-USED	NA
P3.5	UN-USED	NA
P3.6	UN-USED	NA
P3.7	UN-USED	NA
P3.8	UN-USED	NA
P3.9	UN-USED	NA
P3.10	UN-USED	NA

Pin No	Signal Name	Direction
P4.1	ANT_SEL_1	OUT
P4.2	ANT_SEL_2	OUT
P4.3	UN-USED	NA
P4.4	UART1_CTS	IN
P4.5	UART1_RTS	OUT
P4.6	UN-USED	NA
P4.7	NWP_LOG_TX	OUT
P4.8	WLAN_LOG_TX	OUT
P4.9	WL_RS232_RX	IN
P4.10	WL_RS232_TX	OUT

Note : All signals are 3.3V COMS logic levels and is referred w.r.t. CC3100 IC. For e.g. UART1_TX is an output from the CC3100.

For the SPI lines, the CC3100 always acts like a slave.

3.4 Jumper details

Reference	Usage	Comments
J5	USB connector	For powering the booster pack when mated with a Launchpad
J6	Power selection	Choose the power supply from the Lauchpad or the on-board USB. J6 (1-2) power from MCU Launchpad J6 (2-3) power from on-board USB using 3.3V LDO
J24	Current measurement	Voltage is measured across the 0.1 Ohm resistor using a voltmeter. Can be used for IDLE and Active currents. For Hibernate currents, remove R42 and connect a ammeter across J24. Range (< 100uA)
J23	OOB Demo	Closed : GPIO_12 is hard pulled to Vcc Open : GPIO_12 is pulled to GND using 33K resistor.
J22	RESET	Closed : Routes the RESET signal from the MCU Launchpad to the CC3100. Open : The RESET is cut off from the MCU. (Used with MSP430 boards where RESET line is muxed with TEST)
J8,J7	Booster pack header	2x10 pins each connected to the Launchpad.
J25	Flash power	Power the top die flash of the CC3100Z

		part with 3.3V LDO. Install this for all boards with the CC3100Z parts.
J2	Sense on power	Sense on power used for internal debug. SOP[2:0] = 000 [Functional 4W] SOP[2:0] = 001 [Functional 2W] SOP[2:0] = 010 [Load from EEPROM] SOP[2:0] = 011 [Boot Debug mode] SOP[2:0] = 100 [UART LOAD] SOP[2:0] = 101 [TESTMODE 3] SOP[2:0] = 110 [TESTMODE 2] SOP[2:0] = 111 [TESTMODE 1]
J1	RF Test	U.FL connector for conducted testing.

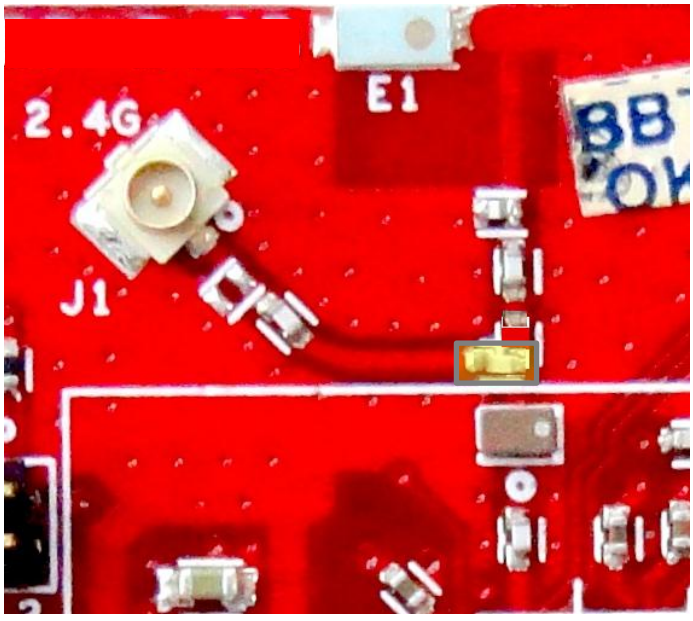
3.5 LED and switches

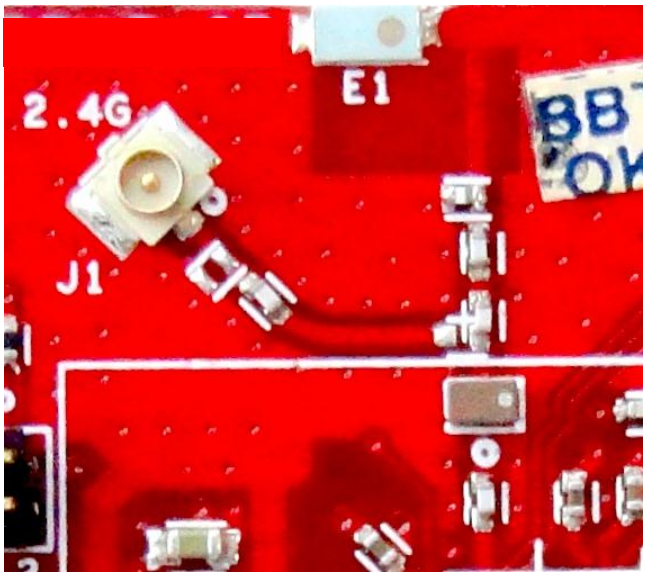
Reference	Usage	Comments
SW1	RESET	Reset the CC3100 when mated with the LP or FTDI board. Useful while updating the flash contents.
SW2	OOB Demo	Pull GPIO_13 to Vcc when pressed.
D1	GPIO_09	Yellow LED to indicate state of GPIO_09. LED glows when GPIO_09 goes low.
D2	GPIO_08	GREEN LED to indicate state of

		GPIO_08. LED glows when GPIO_08 goes low.
D7	nHIB	Green LED Glows when the CC3100 device is enabled using nHIB.
D5	Power	RED LED to indicate the power line status. Note : This LED can glow if the board is powered from any of the GPIO being high, and the Vcc is un-connected. This is not a valid state and should be avoided.

3.6 Conducted testing

The board is by default configured for radiated measurement using the on-board chip antenna. For conducted testing in the lab the following changes needs to be done on the board.

Mode	**Change**	**Image**
Conducted test using U.FL	C4 = 10pF C2 = DNP	

Radiated test using antenna	C4 = DNP C2 = 10pF	

Note : The 10pF capacitor used should be of RF grade with high-Q to reduce the overall loss. Otherwise a 0 Ohm resistor can also be used for this.

3.7 Current measurement

The board provides a jumper connected to a 0.1 Ohm resistor for current measurement. The measurement is made by using a voltmeter across the jumper and multiplying the value obtained in mV by 10 to get the current in mA. The current measurement jumper is J24 as shown in Figure 1.

Note : The measurement may have up to 10% error due to resistor variation and contact resistance due to reflow soldering.

4 Connecting to a PC using FTDI Board

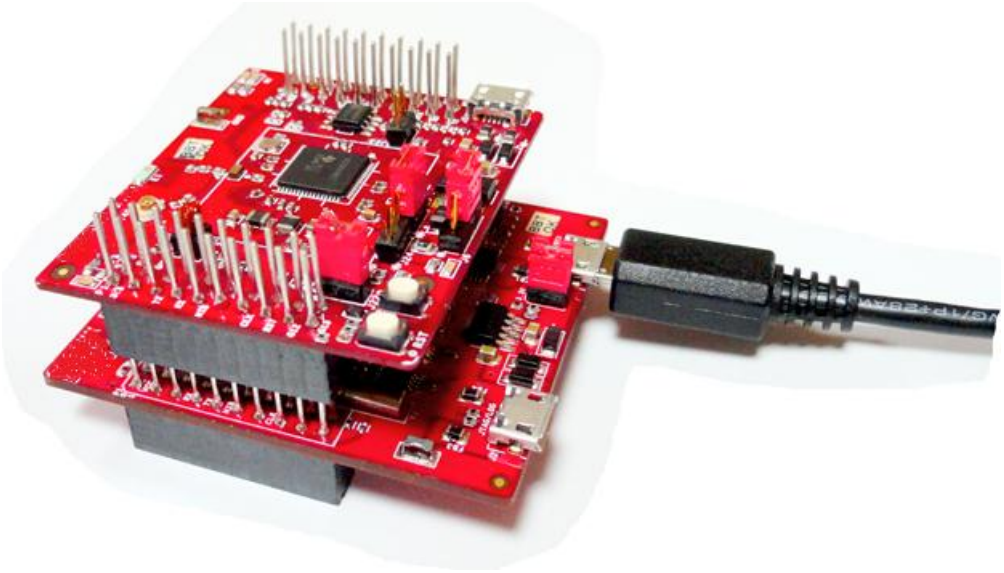


FIGURE 2 : PC CONNECTION USING FTDI

The image above shows the connection of the Booster Pack to the FTDI Board. The connectors should be aligned carefully considering that it does not have a polarity protection. The pin-1 of the connectors are marked on the board using a DOT and these should be aligned while mating.

Note : The mating and unmating force needed for these connectors may be large and may end up breaking the boards. To prevent this caution should be restrained while unmating these. Also , it is not recommended to mate the connectors all the way. About 3mm contact length is good enough for the board as shown in the figure above.

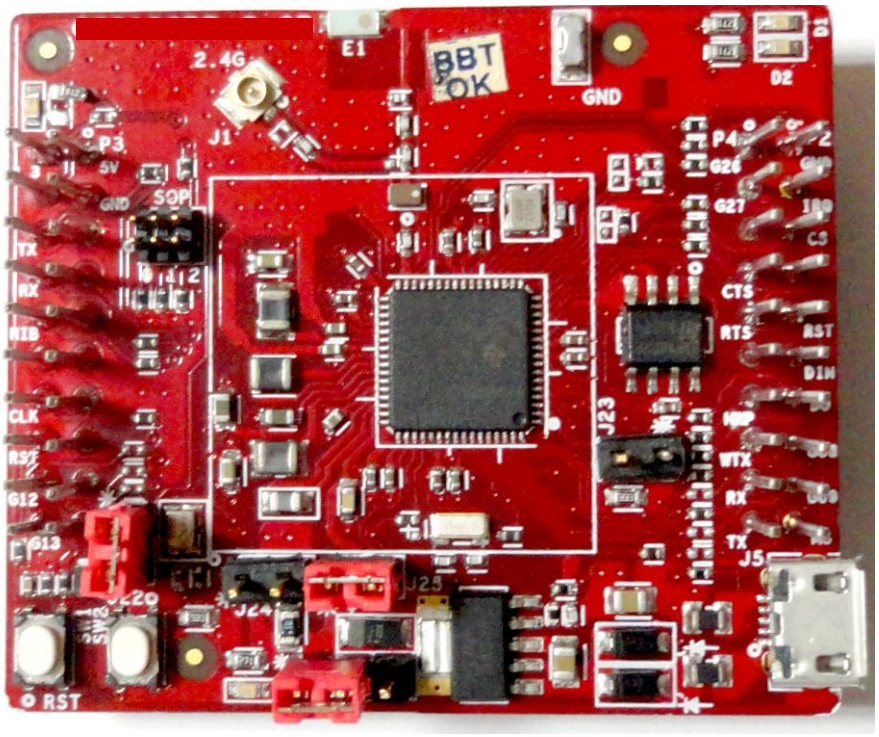
4.1 Jumper settings on the BP Board

The following table specifies the jumpers to be installed while mating with the FTDI board.

No	Jumper settings	Notes
1	J6 (1-2)	Power the BP from the FTDI. The jumper shall be placed close to the LED.
2	J25 (shorted)	The top die flash on CC3100Z devices powered from 3.3V directly
3	J24 (open)	No current measurement

4	J23 (open)	OOB demo jumper
5	SOP jumpers	All open
6	J22 (shorted)	RESET control from FTDI and BP button

After installing these jumpers the board would resemble as below

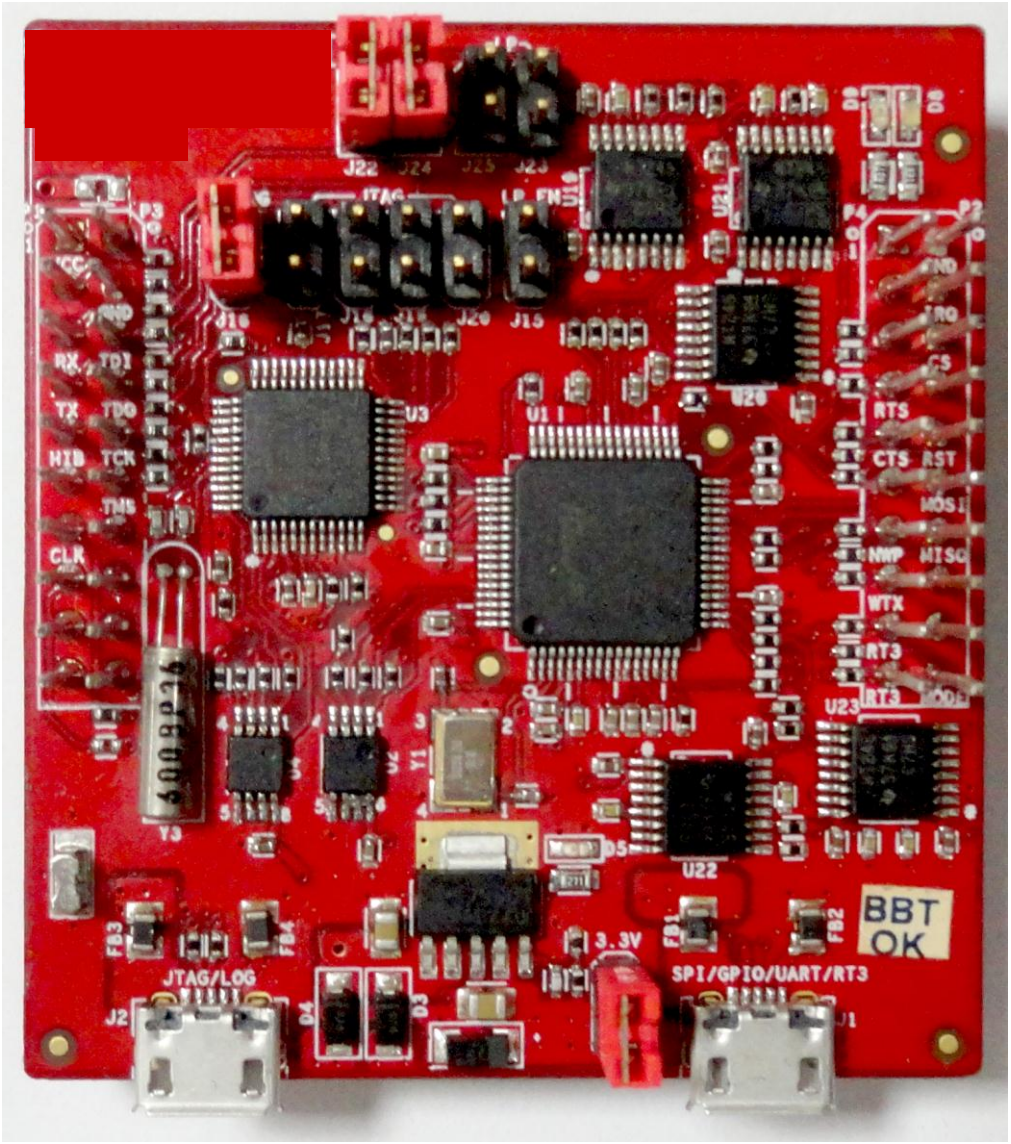


4.2 Jumper settings on the FTDI Board

The following table specifies the jumpers to be installed while mating with the FTDI board.

No	Jumper settings	Notes
1	J22, J24, J21 shorted	
2	Remaining jumpers Open	

After installing the jumpers, the board would resemble below

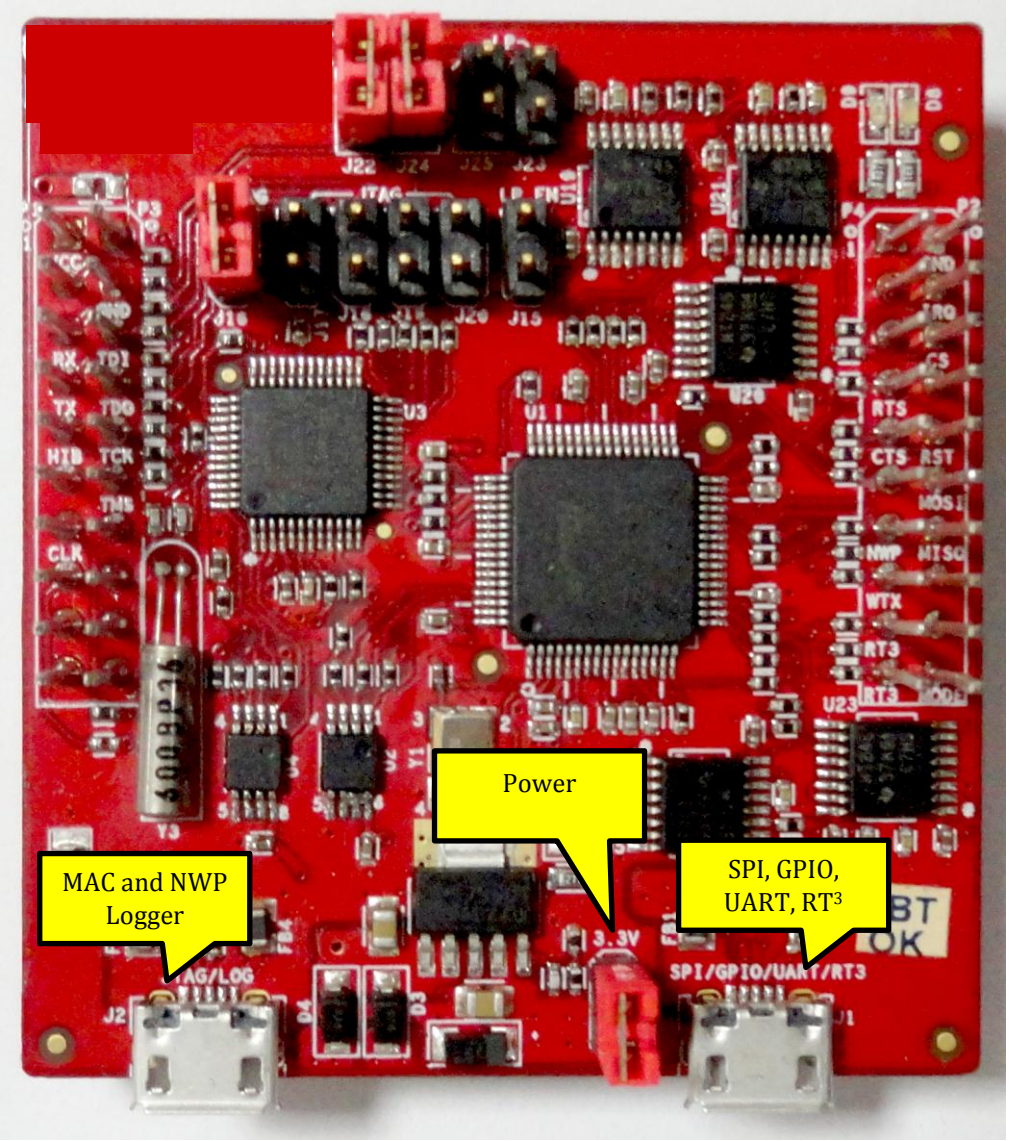


4.3 FTDI Board details

4.3.1 Overview

The FTDI Debug Board 2.0A is designed to connect the Booster pack to a PC using USB connection. This is used to update the firmware on the BP using the “SL_Prog” utility and also in software development using “SL_Studio”.

4.3.2 Hardware details



The board has two FTDI ICs to enumerate multiple COM and D2XX ports. The details of the ports are given below

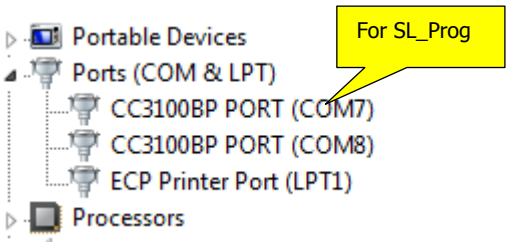
Ports available on J1

Port No	Port Type	Usage	Comments
1	D2XX	SPI port for SL Studio	
2	D2XX	GPIO for SL Studio	Control the nRESET, nHIB, IRQ

3	VCP	COM port for flash programming	
4	VCP	RT3	For RF debug using RT3 software

Note : On the PC only two of the four ports would be visible on the Device Manager. The D2XX ports are not listed under the “Ports” tab.

The first COM port in the list usually is used for the flash programming.



Ports available on J2

Port No	Port Type	Usage	Comments
1	VCP	MAC logg UART Tx for WLAN Debug	
2	VCP	NWP log UART Tx for debugging	

4.3.3 Driver requirements

The FTDI Debug board requires the user to install the associated drivers on a PC. This package is available as part of the SDK release and would be located at [Install-Path]\cc3100-sdk\tools\cc31xx_board_drivers\.

The install path is usually C:\ti\cc3100SDK

5 Connecting to a Launchpad

The CC3100 Booster pack can be directly connected to a compatible Launchpad using the standard 2x20 pin connectors. The jumper settings needed for this connection is the same as that needed for the FTDI Debug board as described in the previous section.

Please ensure that the Pin1 of the 2x20 pins are aligned correctly before mating. The mated setup is as per the picture below. (Note the USB cable is connected to the Booster Pack directly to power it only. For debugging, the USB cable on the Launchpad is also required)

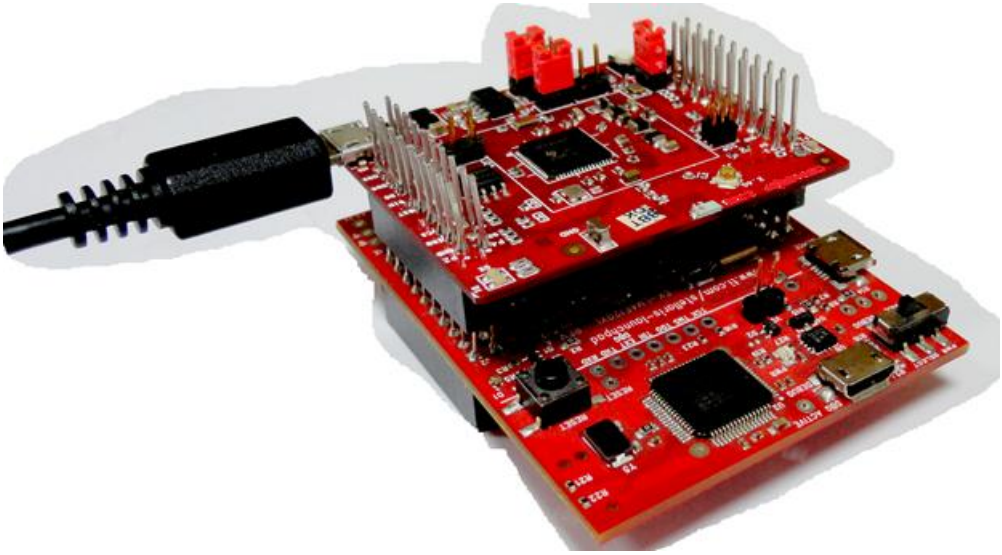


FIGURE 3 : BOOSTER PACK CONNECTED TO TIVA LAUNCHPAD

5.1 Launchpad current limitation

Some of the launchpads including the MSP430FRAM launchpads do not provide enough current to power the CC3100 booster pack. The booster pack can consume upto 400mA peak from the 3.3V and hence it may be needed to power is separately.

For this a USB connector is provided on the Booster Pack to provide the 3.3V separately.

The power supply jumpers shall be configured as below when the power is supplied from the on-board USB connector.

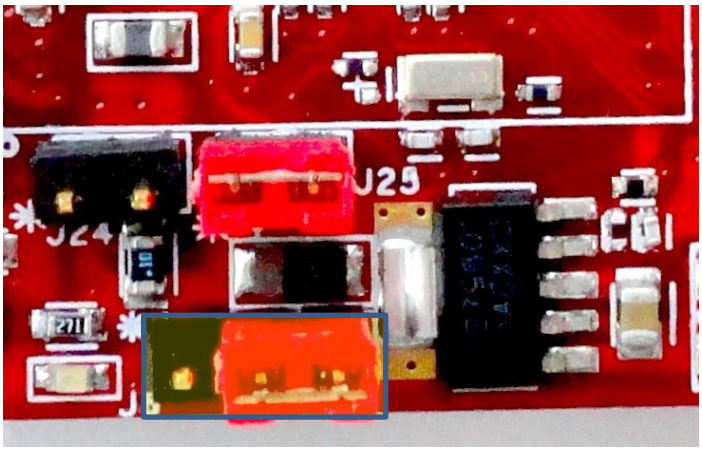


FIGURE 4 : JUMPER SETTINGS WHEN USED WITH LAUNCHPAD

Important : Since there are two power sources in this setup it is important to follow the power-up sequence.

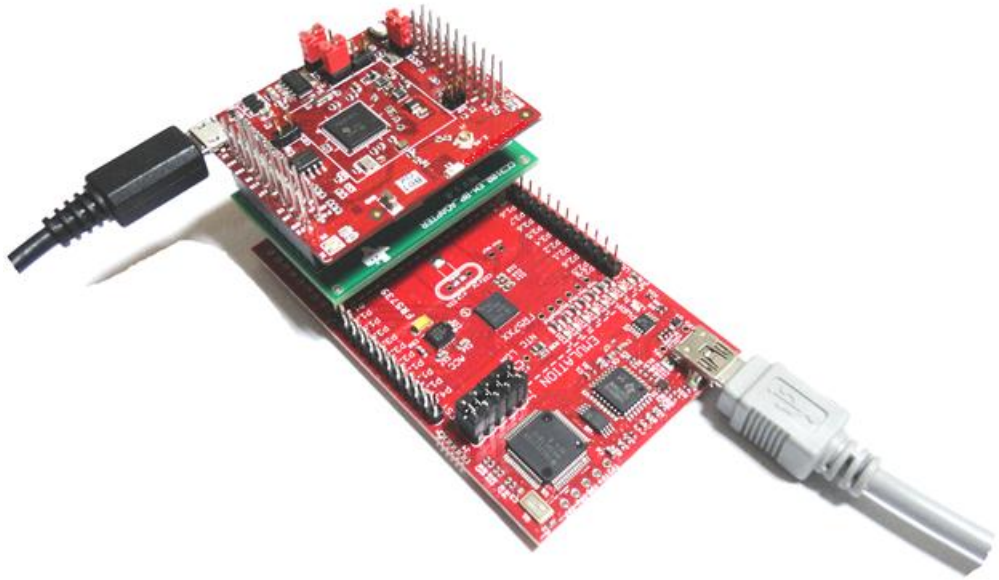
Note : Always power the Booster Pack before powering the Launchpad.

5.2 Connecting to an experimenter's board.

The Boosterpack could be connected to an experimenters board like the MSP430 FRAM experimenter's board using an EM Adapter board.

The EM adapter board converts the EM connectors to the standard 2x20 pin connectors of the booster pack headers.

The stacked setup is as shown below. Ensure that the connectors are oriented correctly before powering up the board.



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Caution

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. Changes or modifications could void the user's authority to operate the equipment.

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- 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.

Industry Canada Compliance (English)

For EVMs Annotated as IC – INDUSTRY CANADA Compliant:

This Class A or B digital apparatus complies with Canadian ICES-003.

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

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This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concerning EVMs Including Detachable Antennas

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

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Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

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2. Use EVMs only after user obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after user obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless user gives the same notice above to the transferee. Please note that if user does not follow the instructions above, user will be subject to penalties of Radio Law of Japan.

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