EM Adapter BoosterPack Quick Start Guide

Introduction
This BoosterPack kit contains one “EM Adapter BoosterPack”. The purpose of the EM adapter board is to provide an easy-to-use bridge between any of the TI MCU LaunchPads and the wide variety of TI RF evaluation modules (EM), for instance the CCxxxx Low-Power RF evaluation modules.

No specific software is provided, so it is up to the user to write the appropriate code to interconnect the MCU with the RF device.

Caution: The board contains electrostatic sensitive components. Handle with care to prevent permanent damage.

Board Features
- Evaluation Module (EM) connectors supporting all EMs from Texas Instruments
- Dual-row LaunchPad (LP) connectors, allowing stacking of XL BoosterPacks.
- USB power supply to support assemblies drawing more current than the LaunchPad is able to source alone.
- Buck/boost voltage regulator, allowing any power source from dual AA alkaline batteries to USB.
- Easy access to all GPIO, both from EM and LP.
- Possibility to mount 32.768 kHz oscillator for EMs that require an external clock.

LP to EM Interconnect
The adapter board is designed to support simple serial communication between the MCU on the LaunchPad and the device on the EM. The following signals are connected:
- SPI (CS, SI, SO, SCLK)
- UART (RX, TX)
- 4 GPIO
- RESET

Additional signals can easily be connected by strapping wires between standard sized test-pin holes on the board.

Hardware Overview

Examples of RF Evaluation Modules
- CC1101EM 868-915 MHz
  www.ti.com/tool/cc1101emk868-915
- CC1120EM 868-915 MHz
  www.ti.com/tool/cc1120emk-868-915
- CC2500EM
  www.ti.com/tool/cc2500emk
- CC2520EM
  www.ti.com/tool/cc2520emk
- CC3000EM
  www.ti.com/tool/cc3000em

What’s Next?
Once you have your preferred LaunchPad and RF evaluation module, you can start looking into the software you would need to write to get things up and running.

A good place to start would be to take a look at the existing software examples for the RF devices, for instance the RF Easy Link software examples for CC110x, CC11xL and CC112x: www.ti.com/lit/zip/swrc253.

There are also several application notes and design notes available, that describe the serial interface of the different RF devices and show how to control the device from an MCU, for instance the MSP430.

This foundation should be sufficient to mix-and-match virtually any combination of LaunchPads and EMs.

Additional References
- Kit product page
  www.ti.com/tool/boost-ccemadapter
- Build Your Own BoosterPack
  processors.wiki.ti.com/index.php/BYOB
- MSP430 ValueLine LaunchPad
  www.ti.com/tool/msp-exp340g2
- Tiva TM4C LaunchPad
  www.ti.com/tool/ek-tm4c123gxl
- C2000 Piccolo LaunchPad
  www.ti.com/tool/launchxl-f28027
- Overview of BoosterPacks
  processors.wiki.ti.com/index.php/BoosterPacks
This is a 20-pin BoosterPack. LP1X and LPX2 are provided to allow stacking in 40-pin BoosterPack systems.

Voltage Regulator for USB Power or Battery Pack
Input 1.8V to 5.5V. Output 3.3V, 500 mA

Power Select Jumper
Jumper between pin 1 and 2 to power from LaunchPad
Jumper between pin 4 and 2 to power from USB
Jumper between pin 1 and 3 to power LP from USB

Optional 32.768kHz signal for selected EM boards
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3.1 **United States**

3.1.1 **Notice applicable to EVMs not FCC-Approved:**

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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 not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment.

**FCC Interference Statement for Class A EVM devices**

*NOTE:* This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
FCC Interference Statement for Class B EVM devices

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.

3.2 Canada

3.2.1 For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-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.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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.

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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Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
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