# Piccolo TMS320F28075 controlCARD R1.1 Information Guide

Version 1.2 – March 2015 *C2000 Systems and Applications Team*

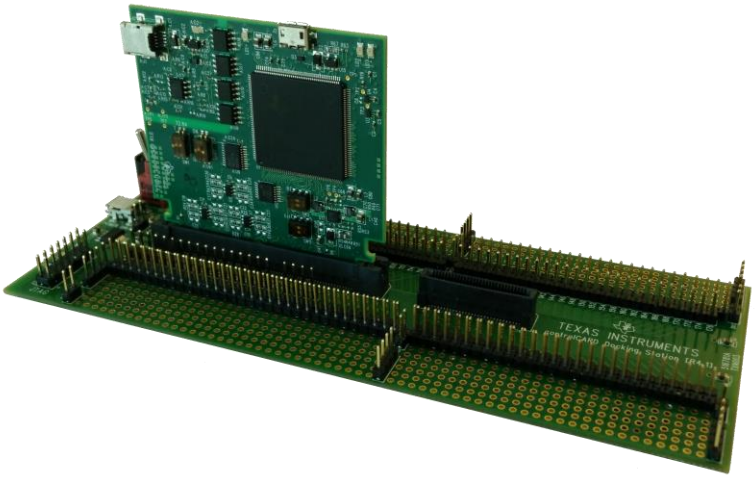

***Fig 1: TMDSDOCK28075 Experimenter's Kit***

## 1 Introduction

The Piccolo F2807x controlCARD kit (TMDSCNCD28075) and the F2807x Experimenter's Kit (TMDSDOCK28075) from Texas Instruments (TI) provide a great way to learn and experiment with the F2807x device family within TI's C2000 family of microcontrollers (MCUs). This 120-pin controlCARD is intended to provide a well-filtered robust design which is capable of working in most environments. This document goes over the hardware details of the F28075 controlCARD and explains the functions, locations of jumpers, and connectors present on the board.

Each controlCARD comes with a "Hardware Developer's Kit", a full set of files necessary to evaluate/develop with a C2000 device. These files include:

- Schematics – Designed in Mentor PADS Logic
- Bill of Materials (BOM)
- Layout PCB files – Designed in Mentor Layout
- Gerber files

NOTE: this kit is designed to explore the functionality of the F2807x microcontroller. Even though the controlCARD can be treated as a good reference design, it is not intended to be a complete customer design. Full compliance to safety, EMI/EMC and other regulations are left to the designer of the final customer's system.

# 2 Errata

Current revision of controlCARD as of 15-August-2014: PCB R1.1

## 2.1 Warnings/Notes/Errata –

Notes on all controlCARDs:

1. The F28075 controlCARD supports USB host/device connectivity. However, the micro-USB port, J2, is not isolated from the board ground. Care should be taken when this controlCARD is being used in a high power application and this USB port is also being used. Note that external USB isolation buffers may be required for these types of applications.

2. The F28075 Experimenter's Kit ships with a USB cable and is designed to be powered via USB. However, in extreme cases the board/controlCARD may require more power than the 5V @ 500mA a computer's USB port can provide (<0.01% of use cases). This is especially true when additional circuitry has been added to the Docking Station.

   In such cases, it is recommended to use an external 5V power supply (2.5mm inner diameter x 5.5mm outer diameter) and plug it into J1. A compatible supply could be the: Phihong *PSAC05R-050(P)-R-C2* + Phihong *RPBAG*

3. The F28075 MCU's GPIO69 and GPIO70 lines are not connected to the controlCARD. Since GPIO69 and GPIO70 are the control pins in the parallel boot mode's handshaking protocol, the parallel boot mode is not directly supported with the F28075 controlCARD. Please note that if the F28075 is put into Parallel Boot Mode on the controlCARD, the device will boot from FLASH.

4. In Boot-from-SCI mode, the MCU will by default expect GPIO84 and GPIO85 to be the IO pins responsible for sending the program to the device. These GPIOs are different from the GPIOs which connect to the isolated USB-to-serial interface via the FTDI chip (which use GPIO28 & GPIO29). To use GPIO28 & 29 instead:

   a. Change the boot mode to Get Mode and then, in your main flashed code, you can decide to call the bootloader for SCIBoot IOOption2 (in the bootROM) always or based on whatever is desired.
   b. Change the boot mode to Get Mode and configure the OTP such that SCIBoot IOOption2 is called. This is really only an option if you always want to boot from SCI or Parallel GPIO because you'll be overwriting your ability to boot from Flash.
   c. With an emulator connected (TRSTn = 1), registers can be set such that SCIBoot's IOOption2 boot mode is called.

   See the TRM of your specific device for more information.

## 2.2 Warnings about Specific controlCARD revisions –

Warnings about R1.1 and earlier controlCARDs:

1. The circuitry used to drive the C2000 MCU's voltage references on the controlCARD is not ideal. Instead, we recommend that users use the voltage reference driving circuitry found in F2837xD_VREFHI_12bitDrivingCkt.pdf which can be found in the same directory as this document. The circuit shown there is for the F2837x device, but a similar approach can be done for the F2807x.

# 3 Getting Familiar with the controlCARD

## 3.1 F28075 controlCARD Features

- **Piccolo F28075 Microcontroller** – High performance C2000 microcontroller is located on the controlCARD.
- **120pin HSEC8 Edge Card Interface** – Allows for compatibility with all of C2000's 180pin controlCARD based application kits and controlCARDs. Any 120pin C2000 controlCard can be used with 180pin docking stations. Compatibility with 100pin controlCARDs can be accomplished using the TMDSADAP180TO100 adapter card (sold separately).
- **Built-in Isolated JTAG Emulation –** An xds100v2 emulator provides a convenient interface to Code Composer Studio without additional hardware. Flipping a switch allows an external JTAG emulator to be used.
- **Connectivity –** The controlCARD contains connectors that allow the user to experiment with USB, and isolated UART/SCI with the F2807x MCU.
- **Key Signal Breakout –** Most GPIO, ADC and other key signals routed to hard gold connector fingers.
- **Robust Power Supply Filtering** – Single 5V input supply powers an on-CARD 3.3V LDO. All MCU inputs are then decoupled using LC filters near the device.
- **ADC Clamping** – ADC inputs are clamped by protection diodes.
- **Anti-Aliasing Filters** – Noise filters (small RC filters) can be easily added on several ADC input pins.

## 3.2 Assumed Operating Conditions

This kit is assumed to run at standard room conditions. The EVM should run at approximately Standard Ambient Temperature and Pressure (SATP) with moderate-to-low humidity.

## 3.3 Using the controlCARD

In order for the controlCARD to work, the controlCARD's MCU must be powered. This is most often done by inputting 5V through the HSEC connector via an accompanying baseboard. For example, if using a Docking Station baseboard, 5VDC should be input into the Docking Station's J1 or J17 and then SW1 will need to be toggled to the appropriate position.

Optionally, the MCU could also be powered via the micro-USB connector on the controlCARD.

Based on the way that the controlCARD will be used, additional hardware settings will be necessary. See the table below:

| | **Debug using CCS and the on-card xds100v2 emulator** | **Debug using CCS and an external emulator via the baseboard** | **Standalone (Boot from FLASH or other boot mode)** |
|---|---|---|---|
| **A:SW1 (controlCARD)** | Position 1: ON (up) | Position 1: OFF (down) | Position 1: OFF (down) |
| **A:J1 (controlCARD)** | Connect a mini USB cable between A:J1 and your computer.<br><br>In CCS, use this target configuration: TMS320F28075 device with an xds100v2 emulator. | --- | --- |
| **SW1 (controlCARD)** | Position 1: OFF (up)<br>Position 2: ON (down)<br><br>Putting the C2000 device into Wait Mode can reduce the risk of connectivity issues. | Position 1: OFF (up)<br>Position 2: ON (down)<br><br>Putting the C2000 device into Wait Mode can reduce the risk of connectivity issues. | Set SW1 as desired |
| **Baseboard's JTAG connector (J2 on the Docking Station baseboard)** | --- | Connect an external emulator. | --- |

***Table 1: Getting Started Reference***

Code Composer Studio (CCS) is an Integrated Development Environment (IDE) used to debug and develop software for the C2000 series of MCUs. It can be downloaded from the following link: http://processors.wiki.ti.com/index.php/Download_CCS

For users new to C2000's F2807x series of devices and CCS, TI's Technical Training Organization provides several workshops (online and in-person) that may be helpful:
http://processors.wiki.ti.com/index.php/C2000_32-bit_Real-Time_MCU_Training
http://processors.wiki.ti.com/index.php/Hands-On_Training_for_TI_Embedded_Processors

The following PDF documents are provided to describe where each of the F2807x MCU's pins will appear on the controlCARD connector/Docking Station:

**TMDSCNCD28075_180cCARD_pinout_R1_1** – tells where each MCU pin will go on the HSEC controlCARD connector or the 120/180-pin controlCARD Docking Station.

**TMDSCNCD28075_100DIMmap_R1_1** – tells where each MCU pin will go to on the DIM100 controlCARD connector or the DIM100 Docking Station. This assumes that the TMDSADAP180TO100 adapter card is used.

More information on the controlCARD/Docking Station can be found at the following locations:
\C2000Ware_X_XX_XX_XX\boards\controlCARDS\TMDSCNCD287075
\C2000Ware_X_XX_XX_XX\boards\ExperimenterKits\
DockingStation_HSEC_120or180pin\

## 3.4 Experimentation Software

All key examples for the F28075 MCU can be found within C2000Ware at:

\C2000Ware_X_XX_XX_XX\device_support\f2807x\

This example software package includes many projects which allow the user to experiment with the ADC, PWM, and other C2000 peripherals.

# 4 Special Notes on Connectivity

## 4.1 xds100v2 Emulator and SCI/UART Connectivity

The F28075 controlCARD provides emulation and USB-to-UART adapter functionality on the controlCARD. This allows for a convenient method to debug and demo the F2807x MCU.

Note that the FTDI chip, its support circuitry, and associated isolation components are placed in Macro A, the left section of the controlCARD. Each of these components contains an additional A within the component reference designator (ie A:R2 for resistor 2 in Macro A).

Each F28075 controlCARD's xds100v2 is programmed with a fixed serial number. If a debug session needs to involve 2 or more F28075 controlCARDs, each controlCARD will need have a unique serial number and some will need to be reprogrammed. See: http://processors.wiki.ti.com/index.php/XDS100#Q:_Can_I_change_the_serial_number_on_my_XDS100v2.3F

The configuration of the switches on A:SW1 determine whether the on-board emulator is active, whether an external emulator can be used, or whether the device will boot from FLASH/peripherals. See Table 2.

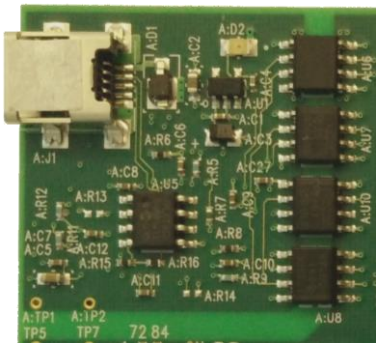


***Fig2: xds100v2 Emulation circuitry and isolation circuitry is denoted by A:***

# 5 Hardware References

On the following pages, Table 2 shows the various connections available on the board. Fig 3, below, illustrates the location of many of these components on the board:

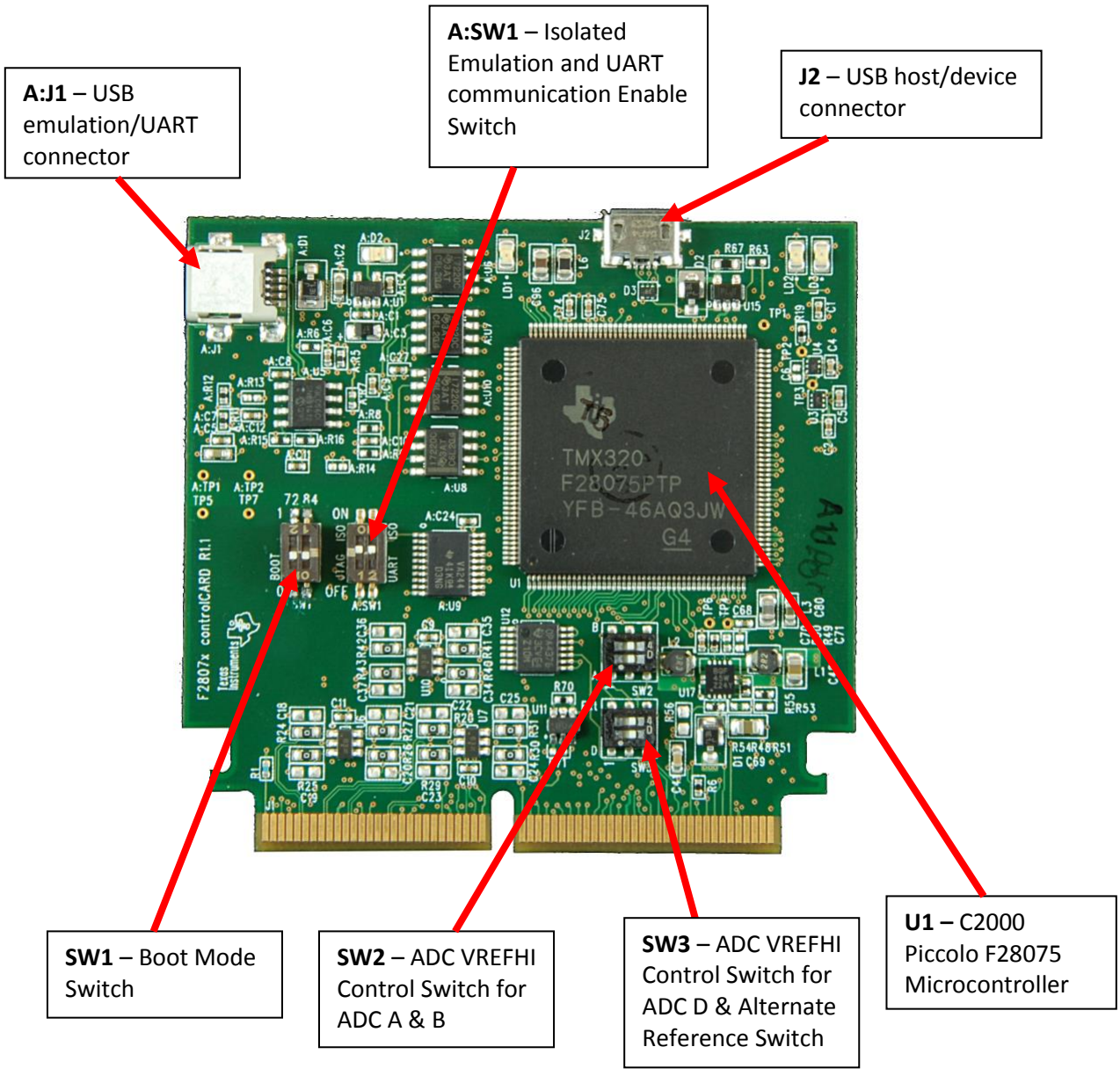


***Fig3: Key components on the controlCARD***

<table>
<tr><th colspan="2">Connectors</th></tr>
<tr><td>A:J1</td><td>Emulation/UART connector - USB mini A connector used to provide xds100v2 emulation and USB-to-UART(SCI) communication through FTDI logic. A:SW1 determines which connections are enabled to the MCU.</td></tr>
<tr><td>J2</td><td>USB connector – USB micro AB connector supports USB 2.0 host/device</td></tr>
<tr><td colspan="2"></td></tr>
<tr><th colspan="2">LEDs</th></tr>
<tr><td>LD1</td><td>Turns on when the controlCARD is powered ON (green)</td></tr>
<tr><td>LD2</td><td>Controlled by GPIO-31 with negative logic (red)</td></tr>
<tr><td>LD3</td><td>Controlled by GPIO-34 with negative logic (red)</td></tr>
<tr><td>A:D2</td><td>Turns on when ISO JTAG logic is powered on (green)</td></tr>
<tr><td>A:D3</td><td>JTAG/UART RX toggle indicator (blue)</td></tr>
<tr><td>A:D4</td><td>JTAG/UART TX toggle indicator (blue)</td></tr>
<tr><td colspan="2"></td></tr>
<tr><th colspan="2">Resistors and Capacitors</th></tr>
<tr><td>R24-R43 and C18-C37</td><td>Optional RC input filter for all ADC inputs</td></tr>
<tr><td colspan="2"></td></tr>
<tr><th colspan="2">Switches (default position in BOLD)</th></tr>
<tr><td>SW1</td><td>Boot Mode Switch:<br>Controls the Boot Options of the F2807x device. See the device datasheet for more information. Note that the switch is placed upside-down, and directions are with respect to the controlCard and not the switch itself. UP is 1 (open) and DOWN is 0 (closed)
<table>
<tr><th>Mode #</th><th>Switch Position 1 (GPIO-72)</th><th>Switch Position 2 (GPIO-84)</th><th>Boot from</th></tr>
<tr><td>00</td><td>DOWN</td><td>DOWN</td><td>Parallel I/O</td></tr>
<tr><td>01</td><td>DOWN</td><td>UP</td><td>Boot from SCI</td></tr>
<tr><td>02</td><td>UP</td><td>DOWN</td><td>Wait Boot Mode</td></tr>
<tr><td>03</td><td>UP</td><td>UP</td><td>Get Mode (Flash by default)</td></tr>
</table>
</td></tr>
</table>

| | |
|---|---|
| **SW2** | ADC VREFHI Control Switch for ADC modules A & B:<br>Switch 1 (lower switch) – VREFHI Control Switch for ADC module A:<br>• In the left position – If SW3 Switch 2 is in the left position ADC-A will be referenced to a precise 3.0V reference located on the controlCard. If SW3 Switch 2 is in the right position ADC-A will be referenced to pin 45 of the HSEC controlCARD connector.<br>• **In the right position** – ADC-A will be referenced to a precise 3.3V reference located on the controlCARD.<br><br>Switch 2 (upper switch) – VREFHI Control Switch for ADC module B:<br>• In the left position – If SW3 Switch 2 is in the left position ADC-B will be referenced to a precise 3.0V reference located on the controlCard. If SW3 Switch 2 is in the right position ADC-B will be referenced to pin 45 of the HSEC controlCARD connector.<br>• **In the right position** – ADC-B will be referenced to a precise 3.3V reference located on the controlCARD. |
| **SW3** | ADC VREFHI Control Switch for ADC modules D &<br>Alternate Reference Configuration:<br>Switch 1 (lower switch) – VREFHI Control Switch for ADC module D:<br>• In the left position – If SW3 Switch 2 is in the left position ADC-D will be referenced to a precise 3.0V reference located on the controlCard. If SW3 Switch 2 is in the right position ADC-D will be referenced to pin 45 of the HSEC controlCARD connector.<br>• **In the right position** – ADC-D will be referenced to a precise 3.3V reference located on the controlCARD.<br><br>Switch 2 (upper switch) – External VREFHI Enable Switches for ADC:<br>• In the left position – A precision 3.0V reference will be provided to ADC-A, ADC-B, or ADC-D if SW2 Switch 1, SW2 Switch 2, or SW3 Switch 1 is in the left position respectively.<br>• **In the right position** – The reference will be given by pin 45 of the HSEC controlCARD connector to ADC-A, ADC-B, or ADC-D if SW2 Switch 1, SW2 Switch 2, or SW3 Switch 1 is in the left position respectively. This will presumably allow the baseboard to provide the desired voltage reference. |

| | |
|---|---|
| **A:SW1** | Isolated emulation & UART communication enables:<br><br>Switch Position 1 – JTAG Enable:<br>• **ON –** All signals between the xds100v2 emulation logic and the MCU will be connected. This setting is valid when the MCU is being debugged or programmed via the on-card xds100v2 emulator.<br>• OFF – The xds100v2 emulation logic will **NOT** be connected to the MCU. This setting is valid when the device will boot from FLASH, boot from a peripheral directly, or when an external JTAG emulator will be used.<br><br>Switch Position 2 – ISO UART communication enable:<br>• **ON** – The C2000 MCU's GPIO-28 (and pin76 of the 180pin controlCARD connector) will be coupled to the FTDI's USB-to-Serial adapter. This allows UART communication to a computer via the FTDI chip. However, in this position, GPIO-28 will be forced high by the FTDI chip. Functionality of pin76 of the connector will be limited.<br>• OFF – The C2000 MCU will **NOT** be connected to the FTDI USB-to-Serial adapter. Pin76 of the 180pin controlCARD connector will be directly connected to GPIO-28. |

***Table 2: Hardware References***

## ADDITIONAL TERMS AND CONDITIONS, WARNINGS, RESTRICTIONS, AND DISCLAIMERS FOR EVALUATION MODULES

Texas Instruments Incorporated (TI) markets, sells, and loans all evaluation boards, kits, and/or modules (EVMs) pursuant to, and user expressly acknowledges, represents, and agrees, and takes sole responsibility and risk with respect to, the following:

1. User agrees and acknowledges that EVMs are intended to be handled and used for feasibility evaluation only in laboratory and/or development environments. Notwithstanding the foregoing, in certain instances, TI makes certain EVMs available to users that do not handle and use EVMs solely for feasibility evaluation only in laboratory and/or development environments, but may use EVMs in a hobbyist environment. All EVMs made available to hobbyist users are FCC certified, as applicable. Hobbyist users acknowledge, agree, and shall comply with all applicable terms, conditions, warnings, and restrictions in this document and are subject to the disclaimer and indemnity provisions included in this document.
2. Unless otherwise indicated, EVMs are not finished products and not intended for consumer use. EVMs are intended solely for use by technically qualified electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems.
3. User agrees that EVMs shall not be used as, or incorporated into, all or any part of a finished product.
4. User agrees and acknowledges that certain EVMs may not be designed or manufactured by TI.
5. User must read the user's guide and all other documentation accompanying EVMs, including without limitation any warning or restriction notices, prior to handling and/or using EVMs. Such notices contain important safety information related to, for example, temperatures and voltages. For additional information on TI's environmental and/or safety programs, please visit www.ti.com/esh or contact TI.
6. User assumes all responsibility, obligation, and any corresponding liability for proper and safe handling and use of EVMs.
7. Should any EVM not meet the specifications indicated in the user’s guide or other documentation accompanying such EVM, the EVM may be returned to TI within 30 days from the date of delivery for a full refund. THE FOREGOING LIMITED WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY TI TO USER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. TI SHALL NOT BE LIABLE TO USER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES RELATED TO THE HANDLING OR USE OF ANY EVM.
8. No license is granted under any patent right or other intellectual property right of TI covering or relating to any machine, process, or combination in which EVMs might be or are used. TI currently deals with a variety of customers, and therefore TI’s arrangement with the user is not exclusive. TI assumes no liability for applications assistance, customer product design, software performance, or infringement of patents or services with respect to the handling or use of EVMs.
9. User assumes sole responsibility to determine whether EVMs may be subject to any applicable federal, state, or local laws and regulatory requirements (including but not limited to U.S. Food and Drug Administration regulations, if applicable) related to its handling and use of EVMs and, if applicable, compliance in all respects with such laws and regulations.
10. User has sole responsibility to ensure the safety of any activities to be conducted by it and its employees, affiliates, contractors or designees, with respect to handling and using EVMs. Further, user is responsible to ensure that any interfaces (electronic and/or mechanical)

between EVMs and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard.

11. User shall employ reasonable safeguards to ensure that user's use of EVMs will not result in any property damage, injury or death, even if EVMs should fail to perform as described or expected.
12. User shall be solely responsible for proper disposal and recycling of EVMs consistent with all applicable federal, state, and local requirements.

**Certain Instructions**. User shall operate EVMs within TI's recommended specifications and environmental considerations per the user's guide, accompanying documentation, and any other applicable requirements. Exceeding the specified ratings (including but not limited to input and output voltage, current, power, and environmental ranges) for EVMs may cause property damage, personal injury or death. If there are questions concerning these ratings, user should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the applicable EVM user's guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, some circuit components may have case temperatures greater than 60°C as long as the input and output are maintained at a normal ambient operating temperature. These components include but are not limited to linear regulators, switching transistors, pass transistors, and current sense resistors which can be identified using EVMs' schematics located in the applicable EVM user's guide. When placing measurement probes near EVMs during normal operation, please be aware that EVMs may become very warm. As with all electronic evaluation tools, only qualified personnel knowledgeable in electronic measurement and diagnostics normally found in development environments should use EVMs.

**Agreement to Defend, Indemnify and Hold Harmless**. User agrees to defend, indemnify, and hold TI, its directors, officers, employees, agents, representatives, affiliates, licensors and their representatives harmless from and against any and all claims, damages, losses, expenses, costs and liabilities (collectively, "Claims") arising out of, or in connection with, any handling and/or use of EVMs. User's indemnity shall apply whether Claims arise under law of tort or contract or any other legal theory, and even if EVMs fail to perform as described or expected.

**Safety-Critical or Life-Critical Applications**. If user intends to use EVMs in evaluations of safety critical applications (such as life support), and a failure of a TI product considered for purchase by user for use in user's product would reasonably be expected to cause severe personal injury or death such as devices which are classified as FDA Class III or similar classification, then user must specifically notify TI of such intent and enter into a separate Assurance and Indemnity Agreement.

# RADIO FREQUENCY REGULATORY COMPLIANCE INFORMATION FOR EVALUATION MODULES

Texas Instruments Incorporated (TI) evaluation boards, kits, and/or modules (EVMs) and/or accompanying hardware that is marketed, sold, or loaned to users may or may not be subject to radio frequency regulations in specific countries.

**General Statement for EVMs Not Including a Radio**

For EVMs not including a radio and not subject to the U.S. Federal Communications Commission (FCC) or Industry Canada (IC) regulations, TI intends EVMs to be used only for engineering development, demonstration, or evaluation purposes. EVMs are not finished products typically fit for general consumer use. EVMs may nonetheless generate, use, or radiate radio frequency energy, but have not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or the ICES-003 rules. Operation of such EVMs may cause interference with radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct this interference.

**General Statement for EVMs including a radio**

*User Power/Frequency Use Obligations*: For EVMs including a radio, the radio included in such EVMs is intended for development and/or professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability in such EVMs and their development application(s) must comply with local laws governing radio spectrum allocation and power limits for such EVMs. It is the user's sole responsibility to only operate this radio in legally acceptable frequency space and within legally mandated power limitations. Any exceptions to this are strictly prohibited and unauthorized by TI unless user has obtained appropriate experimental and/or development licenses from local regulatory authorities, which is the sole responsibility of the user, including its acceptable authorization.

**U.S. Federal Communications Commission Compliance**

**For EVMs Annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant**

**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.

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

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 its own expense.

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

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.

**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.

**Concerning EVMs Including Radio Transmitters**

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.

**Canada Industry Canada Compliance (French)**

Cet appareil numérique de la classe A ou B est conforme à la norme NMB-003 du Canada

Les changements ou les modifications pas expressément approuvés par la partie responsable de la conformité ont pu vider l'autorité de l'utilisateur pour actionner l'équipement.

**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.

**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.

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



## Important Notice for Users of EVMs Considered “Radio Frequency Products” in Japan

**EVMs entering Japan are NOT certified by TI as conforming to Technical Regulations of Radio Law of Japan.**

If user uses EVMs in Japan, user is required by Radio Law of Japan to follow the instructions below with respect to EVMs:

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry’s Rule for Enforcement of Radio Law of Japan,
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.

http://www.tij.co.jp

【無線電波を送信する製品の開発キットをお使いになる際の注意事項】
本開発キットは技術基準適合証明を受けておりません。 本製品の
ご使用に際しては、電波法遵守のため、以下のいずれかの措置を取っていただく必要がありますのでご注意ください。

1. 電波法施行規則第6条第1項第1号に基づく平成18年3月28日総務省告示第173号で定められた電波暗室等の試験設備でご使用いただく。
2. 実験局の免許を取得後ご使用いただく。
3. 技術基準適合証明を取得後ご使用いただく。。

なお、本製品は、上記の「ご使用にあたっての注意」を譲渡先、移転先に通知しない限り、譲渡、移転できないものとします
上記を遵守頂けない場合は、電波法の罰則が適用される可能性があることをご留意ください。

日本テキサス・インスツルメンツ株式会社

東京都新宿区西新宿６丁目２４番１号

西新宿三井ビル

http://www.tij.co.jp

Texas Instruments Japan Limited

(address) 24-1, Nishi-Shinjuku 6 chome, Shinjuku-ku, Tokyo, Japan