Bluetooth® Low Energy
CC2541 Advanced Remote Control Kit
User's Guide

Document Number: SWRU343

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Development Kit Part Number: CC2541DK-RC

TABLE OF CONTENTS

1. References

The following references provide additional information on the CC2540, CC2541, the Texas Instruments *Bluetooth®* low energy (BLE) stack, the BLE HID over GATT profile the HID Service, and the BLE specification in general. (All path and file references in this document assume that the BLE development kit software has been installed to the default path C:\Texas Instruments\BLE-CC254x-1.3.1\)

1.1 Printed Copy Included in the Box with CC2541-ARC

[1] CC2541 Advanced Remote Control Kit Quick Start Guide (SWRU341)

1.2 Included with Texas Instruments *Bluetooth* Low Energy Software Installer

(The software installer is available for download at **www.ti.com/ble-stack**)

[2] Texas Instruments *Bluetooth®* Low Energy Software Developer's Guide (SWRU271)
C:\Texas Instruments\BLE-CC254x-1.3\Documents\TI_BLE_Software_Developer's_Guide.pdf

[3] TI BLE Vendor Specific HCI Reference Guide
C:\Texas Instruments\BLE-CC254x-1.3\Documents\TI_BLE_Vendor_Specific_HCI_Guide.pdf

[4] Texas Instruments BLE Sample Applications Guide (SWRU297)
C:\Texas Instruments\BLE-CC254x-1.3\Documents\TI_BLE_Sample_Applications_Guide.pdf

1.3 Available from *Bluetooth* Special Interest Group (SIG)

[5] *HID over GATT profile*, Version 1.0 (27-Dec-2011)
https://www.bluetooth.org/docman/handlers/downloaddoc.ashx?doc_id=245141

[6] HID Service, Version 1.0 (27-Dec-2011)
https://www.bluetooth.org/docman/handlers/downloaddoc.ashx?doc_id=245140

[7] *Specification of the Bluetooth System*, Covered Core Package version: 4.0 (30-June-2010)
https://www.bluetooth.org/technical/specifications/adopted.htm

2. Introduction

Thank you for purchasing a Texas Instruments (TI) *Bluetooth®* low energy (BLE) Advanced Remote Control Kit. The purpose of this document is to give an overview of the hardware and software included in the CC2541 Advanced Remote Control Kit (CC2541ARC).

The information in this guide will get you up and running with the kit; however for more detailed information on BLE technology and the TI BLE protocol stack, please consult the Texas Instruments *Bluetooth®* Low Energy Software Developer's Guide [2].

For more information on the HID over GATT profile (Human Interface Device over Generic Attribute Profile), HOGP for short, which is the BLE profile used to transfer HID Reports such as keyboard and mouse keys, see the HID over GATT profile[5] and HID Service[6] specifications available from the *Bluetooth®* Special Interest Group website.

2.1 Kit Contents Overview

The kit contains the following hardware components including cables:

	Advanced Remote Control	CC2540 USB Dongle	CC Debugger
CC2541DK-RC	•	•	•

The **CC2541 Advanced Remote Control** is designed to act as a HID Peripheral Device (BLE Slave), operating according to the specifications laid out in the HID over GATT profile [5]. It comes pre-assembled in plastic casing with rubber buttons, battery enclosure and a hole to access the programming header.

The Advanced Remote Control operates on three 1.5V alkaline AAA (LR03) batteries. Available peripheral hardware on the board includes a buzzer, gyroscope, accelerometer and shift registers for key scanning. The PCB design also includes a 3.3V LDO (TPS78330) to lower the voltage from a maximum 4.5 Volt to 3.3 Volt for use by the integrated circuits.

The **CC2540 USB Dongle** can be used to emulate any Bluetooth low energy behavior but is usually acting as a Central Device (BLE Master) and HID Host. In this kit it comes pre-loaded with firmware that acts in a Central role and as a *HID Service* client towards the Advanced Remote Control and sends received input data to emulated Human Interface Devices (USB HID) on a connected Windows, Linux or OSX computer.

The **CC Debugger** is used to flash the software onto both the USB Dongle as well as the Advanced Remote Control. It can also be used for debugging software using IAR Embedded Workbench.

Figure 1 – Hardware Included with CC2541ARC

The RF Boards in this kit are FCC and IC certified and tested to comply with ETSI/R&TTE over temperature from 0 to +35°C.

Caution! The kits include a non-rechargeable lithium battery. Always make sure the battery is removed from the CC2540/41 Keyfob when it is connected to an external power source (Do <u>not</u> apply voltage > 3.6V). Dispose the battery properly and keep out of the reach of children. If swallowed, contact a physician immediately.

⚠ **Caution!** The kits contain ESD sensitive components. Handle with care to prevent permanent damage.

2.2 System Requirements

2.2.1 Dongle

To use the CC2540USB dongle as a bridge between the Advanced Remote Control and a host computer, only USB HID support in the operating system is necessary.

For computers without *Bluetooth*® low energy capable hardware and native support for the HID over GATT profile in the operating system, using the dongle is a good way to start, as it hides the wireless aspect completely from the operating system.

From a hardware standpoint, the Windows PC must contain one free USB port. An additional free USB port is required in order to use the CC Debugger and the USB Dongle simultaneously.

2.2.2 Windows 8

For computers running Windows 8, the requirement is a *Bluetooth*® 4.0 dual mode dongle or internal hardware, with hardware drivers that support *Bluetooth*® low energy. This can be verified in the Windows Device Manager by checking that there are references to e.g. "Bluetooth LE Enumerator"
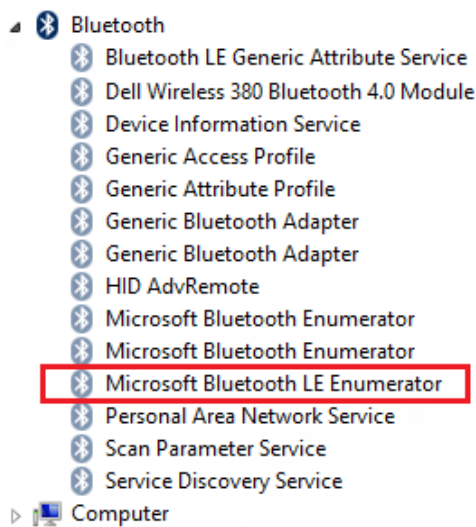

Figure 2 Bluetooth devices as seen in Windows Device Manager

2.2.3 Debugging

IAR Embedded Workbench for 8051 development environment is required in order to make changes to the keyfob software. More information on IAR can be found in the Texas Instruments *Bluetooth*® Low Energy Software Developer's Guide [1].

3. Using the CC2540 USB Dongle

This section describes how the USB dongle appears to a computer running Windows 7, how it operates and how to use the buttons on the dongle.

3.1 Plugging it into a computer

As the CC2540 USB dongle comes pre-programmed with emulated Human Interface Device USB endpoints, no extra drivers are necessary, and it should work out of the box. After the USB dongle has been discovered and configured by Windows you will notice some extra USB HID devices in the device manager.
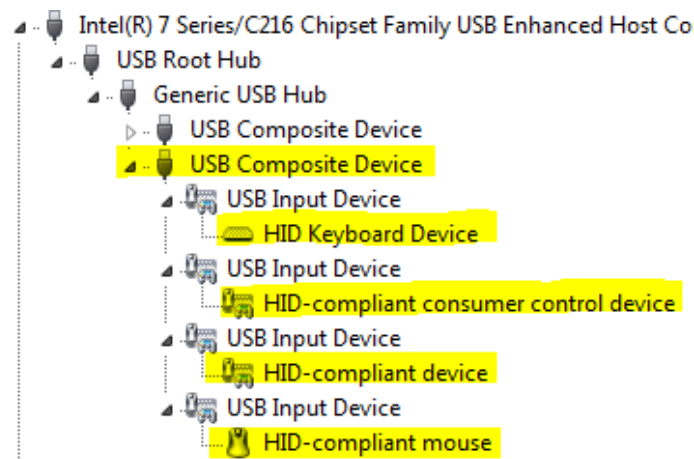

Figure 3 CC2540 USB Dongle, when viewed in Device Manager sorted by connection.

Figure 3 above shows the USB dongle enumerated as a *USB Composite Device* with four interfaces which represent different capabilities of the Advanced Remote Control and USB dongle:

HID Keyboard Device
   o   Number keys, arrow keys, OK and Back on the Advanced Remote

HID-compliant consumer control device
   o   Volume buttons, play, pause, rewind and similar consumer device control buttons

HID-compliant mouse
   o   Movement data sent from the Advanced Remote when the mouse is activated

HID-compliant device
   o   Control point for communication between USB dongle firmware and applications running on the computer. Can be used for pairing, pin codes, feedback, resetting etc. Not in use by the pre-programmed USB dongle firmware.

3.2 Connecting to the Advanced Remote Control

3.2.1 First Time Pairing

When the devices are programmed, they lose all stored pairing information. The dongle will power up and show a solid red LED. To initiate a connection to an ARC press the SW2 button on the HID dongle. This will cause the HID Dongle to scan for an ARC for 5 seconds. While scanning, the red LED will blink once a second. Press any key on the ARC to start advertising.

Once a suitable advertisement has been found, the CC2540 USB dongle will connect, pair and exchange long-term bonding information with the remote, perform discovery of the services and characteristics used by the HID over GATT profile and enable GATT notifications to be sent for button presses and mouse movements from the Advanced Remote.

The green LED will light up when the connection is alive, and the red LED will blink when data is received. The connection will be terminated to save power after the Advanced Remote has been idle for 60s.
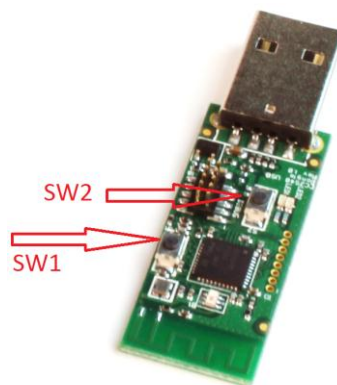

Figure 4:

SW1 - Clear bonding information

SW2 - Scan and pair with Advanced Remote Control

Sequence
1. Press **SW2** to start scanning for remote. Blinking red LED indicates scanning.
2. Press any key on remote to start advertising.
3. Verify green LED which indicates a successful connection.

3.2.2 Connection for Devices which are Already Bonded

If a HID Dongle and Advanced Remote previously paired and stored bonding data, then the HID Dongle will continuously scan for this specific Advanced Remote. When in this continuous scanning mode, the HID Dongle will blink the green LED once a second.

A HID dongle only stores pairing information for one remote, so other remotes will not be able to connect to the HID dongle until the bonding info is cleared.

3.2.3 Disconnecting

Pressing **SW2** on the dongle will cause it to disconnect from the Advanced Remote Control and go back to scanning, but to retain long-term bonding information.

Since the Advanced Remote and the USB dongle are bonded and notifications are enabled on the remote, activating the Advanced Remote Control will cause it to start advertising, reconnect and immediately transmit the button press(es) recorded while disconnected.

3.2.4 Removing long term bond-data

Pressing **SW1** as seen on Figure 4 while not in a connection will cause the USB dongle to erase its record of the long-term bonding data stored for the Advanced Remote in the Flash memory of the USB dongle.

This will not affect the data stored on the Advanced Remote. See the section on the Advanced Remote for information on how to erase this data.

3.2.5 LED states

LED Action	HID Dongle State
Solid Red	Idle
Blinking Red	Scanning for any BLE advanced remote
Solid Green	Connected
Blinking Green	Scanning for previously bonded remote

3.2.6 Button Actions

Button	State	Action
SW1	Idle	Erase bonding info
SW2	Idle	Start scanning
SW2	Connected	Disconnect

4. Connecting the Advanced Remote Control to Windows 8

Once *Bluetooth®* low energy capable hardware is installed in a Windows 8 computer and updated drivers are installed (refer to section 2.2.2), you can discover and use the Advanced Remote Control by following the steps below.

4.1 Open the "Devices" tab of "PC Settings" and click "Add a Device"

On the PC, move your mouse pointer to the lower right hand corner and click on "Settings".
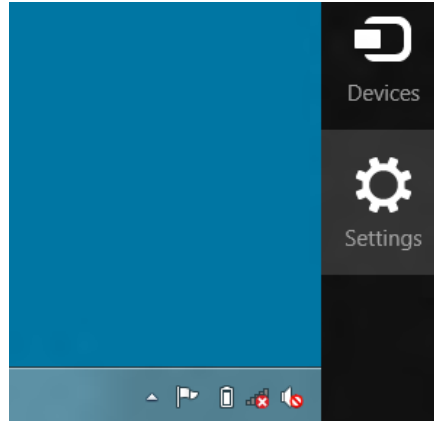

Figure 5 "Settings" icon visible when moving cursor to lower right hand corner

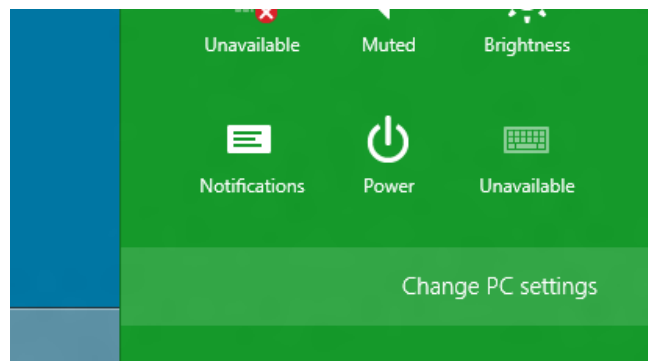A new widget will appear, allowing you to click on "Change PC settings".

Figure 6 Click "Change PC settings"

This will open up the PC settings panel, allowing you to add and remove devices.
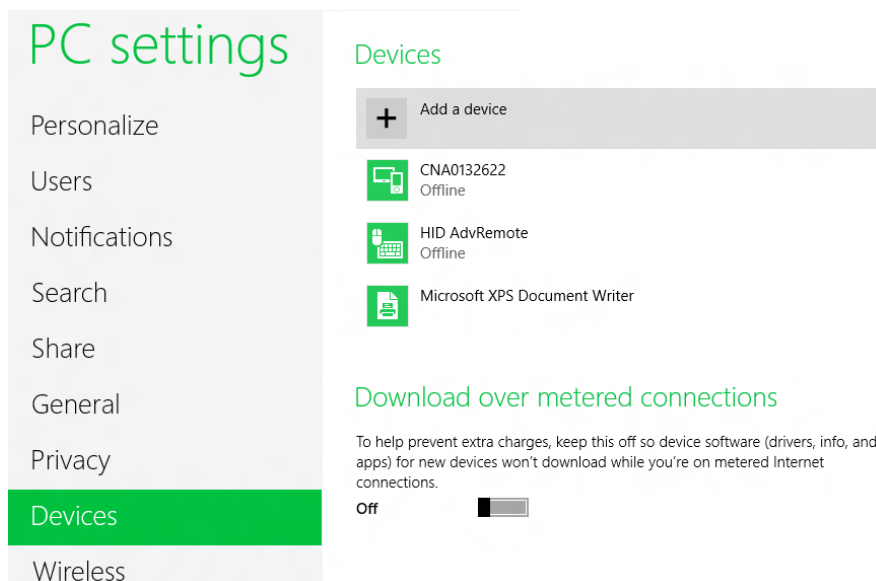

Figure 7 Adding a device

4.2 Adding the Advanced Remote Control

After clicking on HID AdvRemote in Figure 8 Windows will try and connect to the Advanced Remote. The Advanced Remote only advertises for 30 seconds, so the user may have to press a key on the remote to place it in advertising mode.
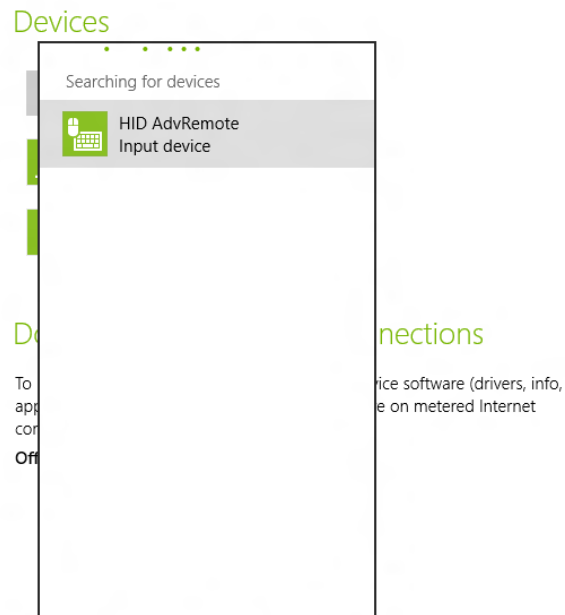

Figure 8

5. Using the Advanced Remote Control

Figure 9 – Advanced Remote Control

5.1 Advertise and connect

Almost all the keys will make the Advanced Remote start advertising and be discoverable by hosts scanning for HID capable BLE devices.

5.2 Keyboard input

Pressing any number will act as a keyboard input of that number. The same goes for OK which is Enter, Back which is Backspace and the four keys surrounding OK, which act as directional or arrow keys.

5.3 Consumer control

Buttons such as Volume, Mute, Play/Pause etc. are consumer control keys, and will control media settings on your computer.

5.4 Mouse input

Holding down the middle mouse button will prompt the Advanced Remote to interpret your movement of the remote as mouse input and send this to the computer.

Double clicking the middle button will lock the mouse function. The left and right buttons act as left and right mouse buttons.

Pressing AV and –/– will decrease and increase mouse speed.

5.5 Remove bond information

Pressing the Red action key (leftmost) will remove bonding information stored on the Advanced Remote. Pairing will have to be done again, using passkey entry if applicable. If the remote is in a connection, the connection will be dropped, and then the bonding information will be erased.

5.6 Calibrate

Pressing the Blue action key (rightmost) will recalibrate the onboard motion sensors. The mouse function must be off and the device must lie on a flat surface when doing this. If the Advanced Remote is not ready for calibration, a high pitched note will sound. Just press the blue key again. During calibration a low-pitched tick will sound for 12 seconds. A high-pitched note at the end indicates success.

6. Programming / Debugging the CC2541 Advanced Remote

The CC Debugger included with the Advanced Remote kit allows for debugging using IAR Embedded Workbench for 8051, as well as for reading and writing hex files to the CC2540/41 flash memory using the SmartRF Flash Programmer software. The hex files are included with the installer. SmartRF Flash Programmer also has the capability to change the IEEE address of the CC2540/41 device. This section details the hardware setup when using the CC Debugger, as well as information on using SmartRF Flash Programmer. Information on using IAR Embedded Workbench for debugging can be found in the Texas Instruments *Bluetooth*® Low Energy Software Developer's Guide [2].

6.1 Hardware Setup for Advanced Remote

The debug port is found on the back side of the remote. Connect the debugger as shown. The red stripe (pin 1) should be on the same side as the blue and #3 keys. When connected properly, the debugger LED will show green after pressing the CC debugger reset button.

Figure 10 Advanced Remote Programming Setup

Power Savings Tip: Leaving the remote in debug mode will cause some extra power drain on the battery. To exit debug mode, remove the debugger cable and power cycle the remote.

6.2 Hardware Setup for USB Dongle

The setup process for flashing the USB Dongle is very similar to the process when flashing the remote. Connect the CC Debugger to the USB Dongle as shown below. Be sure that the ribbon cable is oriented properly, with the red stripe connected to pin 1 as shown in figure below. The USB dongle also must be powered to program, and should be placed in a USB port prior to programming with CC Debugger.


Figure 11 CC2540 USB Dongle Connected to CC Debugger

Connect the CC Debugger to the PC USB port. The status indicator LED on the CC Debugger should turn on. If the LED is red, that means no CC2540 device was detected. If it is green, then a CC2540 device has been detected. If the USB Dongle is connected and the LED is red, try pressing the reset button on the CC Debugger. This resets the debugger and re-checks for a CC2540 device. If the LED still does not turn green, re-check that all cables are securely connected. Once the CC Debugger status LED is showing green, you are ready to use IAR to debug or to read or write a hex file from/to the USB Dongle.

6.3 Using SmartRF Flash Programmer Software

Note: the instructions in the section apply to the latest version of SmartRF Flash Programmer (version 1.12.6), which is available at the following URL: http://www.ti.com/tool/flash-programmer

To start the application go into your programs by choosing Start > All Programs > Texas Instruments > SmartRF Flash Programmer > SmartRF Flash Programmer. The program start-up screen is shown below.
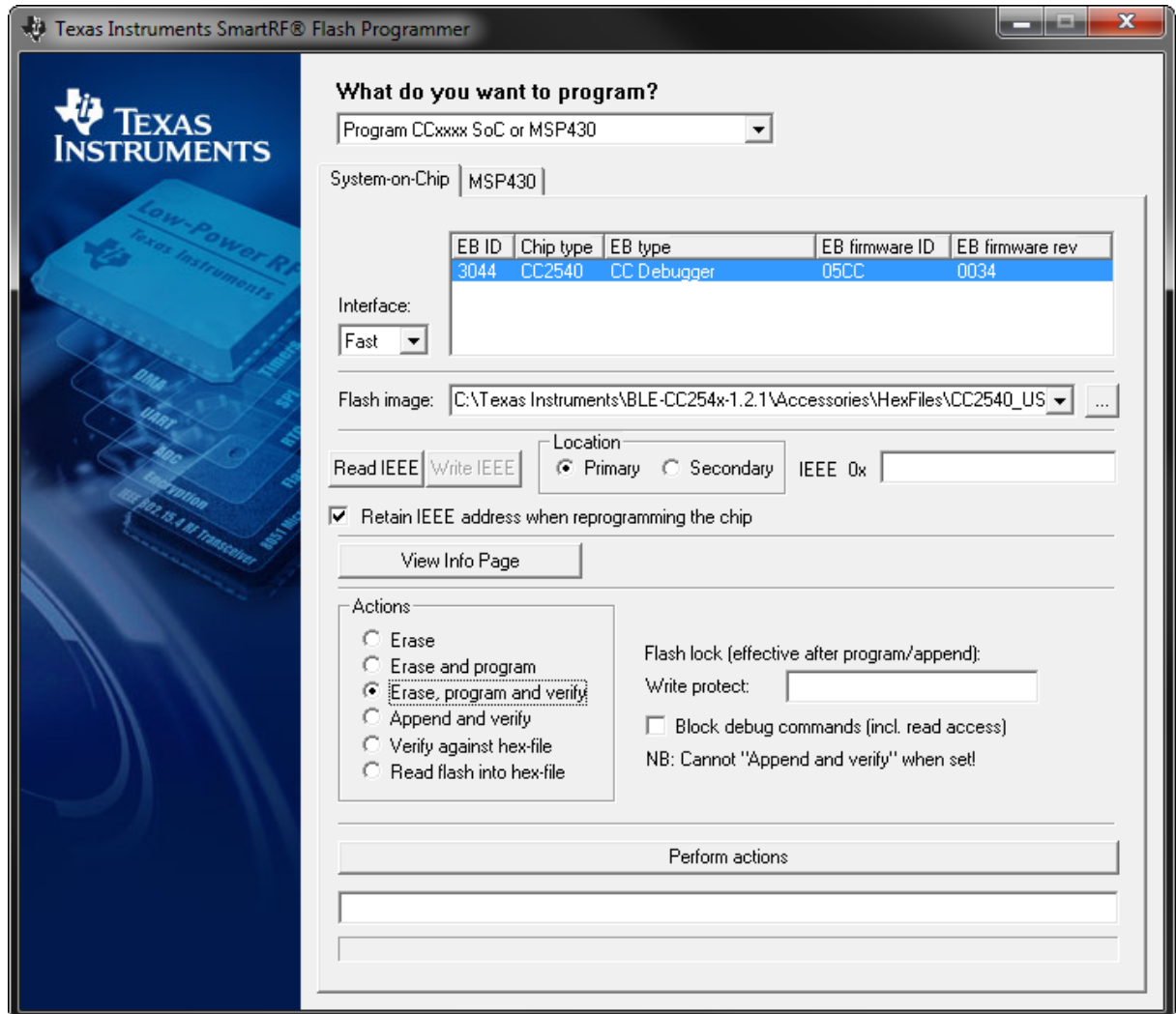
Flash Programmer

Note. If you get prompted to update the EB Firmware (CC Debugger), follow the presented instructions to update the CC Debugger.

6.3.1 Reading or Writing a Hex File to the CC2540/41

To read or write a hex file to the CC2540/41, select the "System-on-Chip" tab (default). The connected CC2540/41 should be detected and show up in the list of devices. Under "Flash image" select the desired hex file that you would like to write to the device. If you are reading from the CC2540/41, under "Flash image" enter the desired path and filename for the hex file. To write to the CC2540/41, under "Actions" select "Erase, program and verify". To read from the CC2540/41, under "Actions" select "Read flash into hex-file". To begin the read or write, click the button "Perform actions".

If the action completes successfully, you should see the progress bar at the bottom of the window fill up, and either one of the following two messages, depending on whether a write or a read was performed: "CC254X - IDXXXX: Erase, program and verify OK" or "CC254X - IDXXXX: Flash read OK".

There are two pre built image files intended for the Advanced Remote Kit.

Project	Directory
HIDAdvRemote	\Accessories\HexFiles\CC2541_ARC_HIDAdvRemote.hex
HIDAdvRemoteDongle	\Accessories\HexFiles\CC2540_USBdongle_HIDAdvRemoteDongle.hex

6.3.2 Reading or Writing the CC2540/41 Device Address

Every CC2540/41 device comes pre-programmed with a unique 48-bit IEEE address. This is referred to as the device's "primary address", and cannot be changed. It is also possible to set a "secondary address" on a device, which will override the primary address upon power-up. Flash Programmer can be used to read the primary address, as well as to read or write the secondary address. For more information refer to the Texas Instruments *Bluetooth*® Low Energy Software Developer's Guide [2].

6.4 Using IAR for Debugging and Programming

IAR is the compiler and IDE used to develop the Advanced Remote and HID dongle. For more information on using IAR refer to the Texas Instruments *Bluetooth*® Low Energy Software Developer's Guide [2]. This section provided a high level overview of advanced remote kit software projects

There are two projects intended for the Advanced Remote Kit.

Project	Directory
HIDAdvRemote	*\Projects\ble\HIDAdvRemote*
HIDAdvRemoteDongle	*\Projects\ble\HIDAdvRemoteDongle*

6.4.1 Advance Remote Project Files

The following are important file componets of the Advance Remote Control project. After opening the project in IAR, these will be visble in the left hand project explorer.

File	Description
hidAdvRemote.c	Top level application. Initialization of remote hardware, connection settings, GATT, and top level task handlers. Keys and gyro/accelerometer callbacks are handled here.
battservice.c	Service for battery. Support characteristics for battery.
devinfoservice.c	Service for device info. Support characteristics such as manufacturer, serial number, etc.
hidDev.c	Service for HID. Support HID reads, writes, queuing reports, state machine.
hidkbmservice.c	Service for keyboard, mouse and consumer control reports.
hid_uuid.h	List of UUIDs for supported HID reports.
Scanparamsservice.c	Service for scan parameters.

6.4.2 HID Dongle Project Files

The following are important file components of the HID Dongle project.

File	Description
hidApp.c	Top level application. Initialization of dongle hardware, service discovery, and connection state machines.
Usb_hid_reports.c	HID to USB report handling.
hid_uuid.h	List of UUIDs for supported HID reports.

7. Software Overview

7.1 HID over GATT

The software supports the HID Over GATT Profile specification which was approved by the BT SIG in December 2011. The specification is publicly available at bluetooth.org. Microsoft Windows 8 supports HID over GATT.

7.1.1 BLE HID Terminology

|	
HID Host	The target machine that the user interacts with (e.g. Laptop, tablet, phone, etc...)
HID Device	The device that is used by the user to interact with the Host (e.g. Keyboard, mouse, remote control, game controller, etc...)
HID Report	A data message sent between the host and device. Input reports go from device-to-host, such as a mouse movement or keyboard press. Output reports go from host-to-device, such as a PC changing the caps lock LED on a keyboard
HID Report Descriptor	A data structure that the device sends to the host which describes the HID device's capabilities, including the types, sizes, and directions of the reports that are supported

7.1.2 GATT Services

The following services are defined in the HID profile specification as either mandatory or optional. The software included with the Advance Remote Kit includes all of these services.

Service	Requirement	Supported
HID Service	Mandatory	Yes
Battery Service	Mandatory	Yes
Device Information Service	Mandatory	Yes
Scan Parameter Service	Optional	Yes

7.1.3 Data Flow

The following data flow shows how HID reports are sent to Central device.
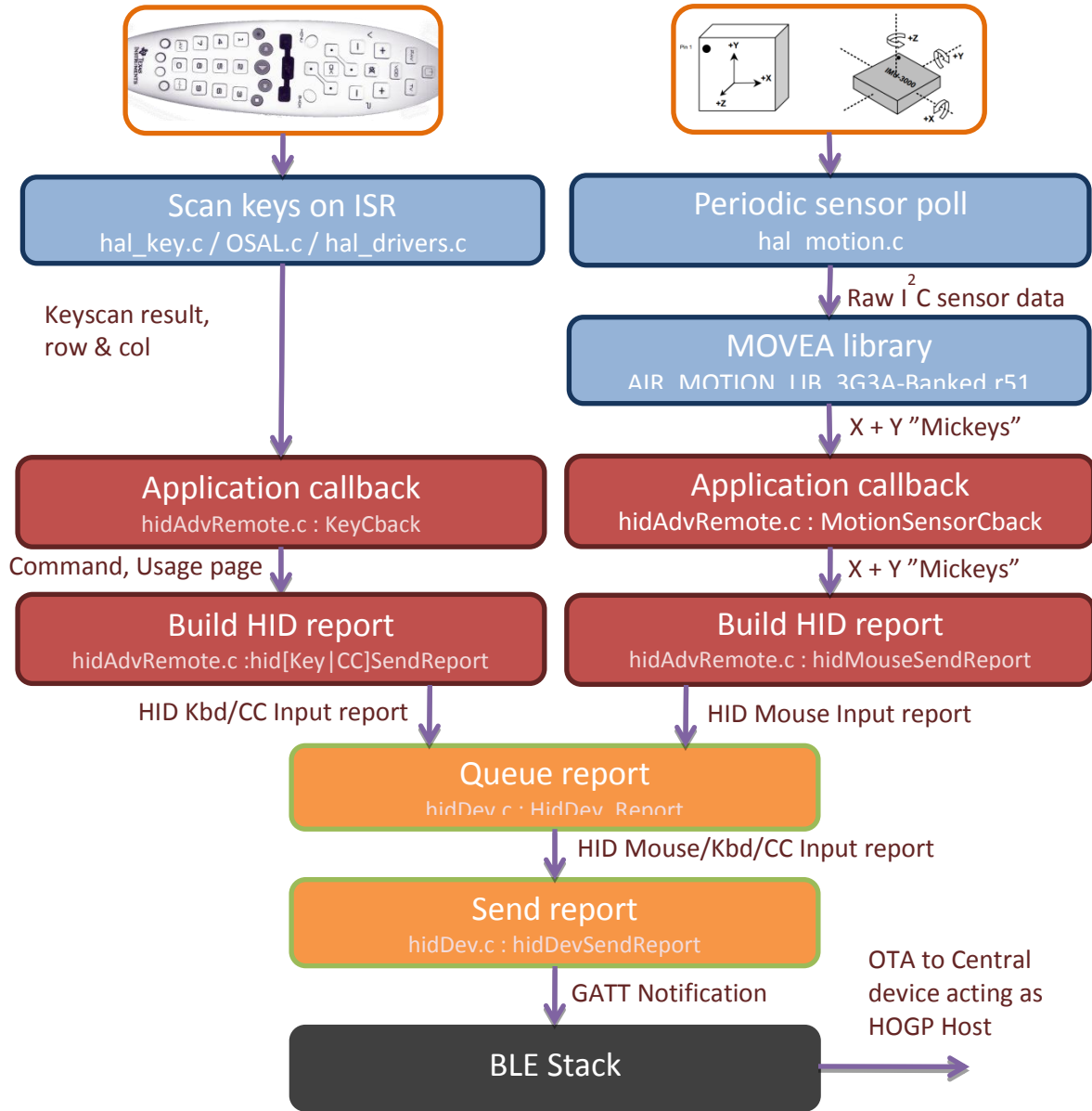
7.1.4 HID Report Overview

The following HID reports are supported in the Advanced Remote Control.

Type	Bytes	Data	Function Ref
Mouse	4	Buttons, X, Y, wheel	hidMouseSendReport
Consumer Control	2	Bitmap command	hidCCSendReport
Keyboard	8	Modifier, reserved, key code 1..6	hidKeyboardSendReport

8. General Information

8.1 Document History

Revision	Date	Description/Change
SWRU343 (1.0)	2013-03-22	Initial release

EVALUATION BOARD/KIT/MODULE (EVM) ADDITIONAL TERMS

Texas Instruments (TI) provides the enclosed Evaluation Board/Kit/Module (EVM) under the following conditions:

The user assumes all responsibility and liability for proper and safe handling of the goods. Further, the user indemnifies TI from all claims arising from the handling or use of the goods.

Should this evaluation board/kit not meet the specifications indicated in the User's Guide, the board/kit may be returned within 30 days from the date of delivery for a full refund. THE FOREGOING LIMITED WARRANTY IS THE EXCLUSIVE WARRANTY MADE BY SELLER TO BUYER AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. EXCEPT TO THE EXTENT OF THE INDEMNITY SET FORTH ABOVE, NEITHER PARTY SHALL BE LIABLE TO THE OTHER FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

Please read the User's Guide and, specifically, the Warnings and Restrictions notice in the User's Guide prior to handling the product. This notice contains important safety information about temperatures and voltages. For additional information on TI's environmental and/or safety programs, please visit www.ti.com/esh or contact TI.

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As noted in the EVM User's Guide and/or EVM itself, this EVM and/or accompanying hardware may or may not be subject to the Federal Communications Commission (FCC) and Industry Canada (IC) rules.

For EVMs **not** subject to the above rules, this evaluation board/kit/module is intended for use for ENGINEERING DEVELOPMENT, DEMONSTRATION OR EVALUATION PURPOSES ONLY and is not considered by TI to be a finished end product fit for general consumer use. It generates, uses, and can radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC or ICES-003 rules, which are designed to provide reasonable protection against radio frequency interference. Operation of the equipment 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: This radio is intended for development/professional use only in legally allocated frequency and power limits. Any use of radio frequencies and/or power availability of this EVM and its development application(s) must comply with local laws governing radio spectrum allocation and power limits for this evaluation module. 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 Texas Instruments unless user has obtained appropriate experimental/development licenses from local regulatory authorities, which is responsibility of user including its acceptable authorization.

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 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

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

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.

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.

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.

【Important Notice for Users of this Product in Japan】

This development kit is NOT certified as Confirming to Technical Regulations of Radio Law of Japan

If you use this product in Japan, you are required by Radio Law of Japan to follow the instructions below with respect to this product:

1. Use this product 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 this product only after you obtained the license of Test Radio Station as provided in Radio Law of Japan with respect to this product, or

3. Use of this product only after you obtained the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to this product. Also, please do not transfer this product, unless you give the same notice above to the transferee. Please note that if you could not follow the instructions above, you will be subject to penalties of Radio Law of Japan.

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【ご使用にあたっての注】

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。
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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。

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EVALUATION BOARD/KIT/MODULE (EVM)
WARNINGS, RESTRICTIONS AND DISCLAIMERS

For Feasibility Evaluation Only, in Laboratory/Development Environments. Unless otherwise indicated, this EVM is not a finished electrical equipment and not intended for consumer use. It is intended solely for use for preliminary feasibility evaluation in laboratory/development environments by technically qualified electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems and subsystems. It should not be used as all or part of a finished end product.

Your Sole Responsibility and Risk. You acknowledge, represent and agree that:

1. You have unique knowledge concerning Federal, State and local regulatory requirements (including but not limited to Food and Drug Administration regulations, if applicable) which relate to your products and which relate to your use (and/or that of your employees, affiliates, contractors or designees) of the EVM for evaluation, testing and other purposes.

2. You have full and exclusive responsibility to assure the safety and compliance of your products with all such laws and other applicable regulatory requirements, and also to assure the safety of any activities to be conducted by you and/or your employees, affiliates, contractors or designees, using the EVM. Further, you are responsible to assure that any interfaces (electronic and/or mechanical) between the EVM 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.

3. You will employ reasonable safeguards to ensure that your use of the EVM will not result in any property damage, injury or death, even if the EVM should fail to perform as described or expected.

4. You will take care of proper disposal and recycling of the EVM's electronic components and packing materials.

Certain Instructions. It is important to operate this EVM within TI's recommended specifications and environmental considerations per the user guidelines. Exceeding the specified EVM ratings (including but not limited to input and output voltage, current, power, and environmental ranges) may cause property damage, personal injury or death. If there are questions concerning these ratings please 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 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 the EVM schematic located in the EVM User's Guide. When placing measurement probes near these devices during normal operation, please be aware that these devices may be very warm to the touch. As with all electronic evaluation tools, only qualified personnel knowledgeable in electronic measurement and diagnostics normally found in development environments should use these EVMs.

Agreement to Defend, Indemnify and Hold Harmless. You agree to defend, indemnify and hold TI, its 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 use of the EVM that is not in accordance with the terms of the agreement. This obligation shall apply whether Claims arise under law of tort or contract or any other legal theory, and even if the EVM fails to perform as described or expected.

Safety-Critical or Life-Critical Applications. If you intend to evaluate the components for possible use in safety critical applications (such as life support) where a failure of the TI 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 you must specifically notify TI of such intent and enter into a separate Assurance and Indemnity Agreement.

IMPORTANT NOTICE

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