Using the UCD3138ACCEVM149

User's Guide
1 Introduction

This UCD3138ACCEVM149 evaluation module is to help evaluate the UCD3138A digital controller device from Texas Instruments and aid in design of digitally controlled isolated power converters. The UCD3138A device belongs to the UCD3138 family of highly integrated digital controller devices optimized for isolated power supply applications.

The UCD3138ACCEVM149 is quite similar to the UCD3138CC64EVM-030. The UCD3138ACCEVM149 is to be used either as a stand-alone control card to study the UCD3138A controller device or as a DPWM controller board working with a power stage board to implement a fully regulated power converter. To help the targeted off-line isolated power applications, this EVM has been designed to work seamlessly with power converter EVM offered by TI: UCD3138ALLCEVM-150. Please contact Texas Instruments for assistance with firmware needed to configure the UCD3138A device and successfully interface UCD3138ACCEVM149 with the above mentioned power converter EVM.

Alternately the EVM can also be loaded with user's custom developed firmware. In order to communicate with the UCD3138A digital controller in this EVM, a separate USB Interface Adapter EVM from Texas Instruments known as the “USB-TO-GPIO Adapter” is required. The USB-TO-GPIO adapter is NOT supplied with UCD3138ACCEVM149 evaluation module and must be purchased separately. Texas Instruments also offers a Graphical User Interface in order to program the UCD3138A controller and configure parameters when used with the power converter EVM mentioned above.

2 Description

The UCD3138ACCEVM149 is an EVM board, functioning as a control card for UCD3138ARGC digital power supply applications. This EVM is used to control a power converter topology such as LLC Resonant Half-Bridge DC converter, etc., by downloading the associated firmware and interfacing with an appropriate power stage board. The EVM works seamlessly with the following EVM board, together with corresponding firmware, all developed by Texas Instruments.

- UCD3138ALLCEVM-150, a digital controlled LLC half-bridge DC-to-DC converter evaluation board

Contact Texas Instruments for assistance with firmware needed to configure the UCD3138A device and successfully interface UCD3138ACCEVM149 with above mentioned power converter EVM.

2.1 Typical Applications

- Off-line Isolated Power Supply Applications (such as, LLC resonant half-bridge DC-to-DC power converter, and phase-shifted full-bridge DC-to-DC power converter)
- Server Systems
- Telecommunication Systems

2.2 Features

- 40-Pin Digital Signal Connector (to connect digital signals to power converters)
- JTAG Connector
- LED Indicator
- PMBus Connector to PC Computer Connection through USB-to-GPIO Adapter
- Rich Test Points to Facilitate the Device Evaluation (system design and circuit and firmware debugging)
- 12-V Input Capable With Onboard Regulator 3.3 V
### Table 1. 3138ACC32EVM-149 Specifications

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>TEST CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector J1</td>
<td>Port of connection to USB-to-GPIO; pin definition refer to TI standard USB-to-GPIO document SLLU093</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connector J2</td>
<td>Port to use on board 3.3 V to bias PMBus(1)</td>
<td>3.25</td>
<td>3.30</td>
<td>3.35</td>
<td>VDC</td>
</tr>
<tr>
<td>Connector J3</td>
<td>Pin definition in compliance with UCD3138</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connector J4</td>
<td>Pin definition in compliance with UCD3138</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connector J5</td>
<td>Port to use 3.3 V on board to bias external circuit</td>
<td>3.27</td>
<td>3.30</td>
<td>3.32</td>
<td>VDC</td>
</tr>
<tr>
<td>Connector J6</td>
<td>Jump across to use JTAG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Connector J7</td>
<td>Jump across to use JTAG</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation Environment</td>
<td>Natural Convection</td>
<td>25</td>
<td></td>
<td></td>
<td>°C</td>
</tr>
<tr>
<td>Mechanical Characteristics</td>
<td>Width</td>
<td>1.8</td>
<td></td>
<td>inches</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Length</td>
<td>3.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Component height</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Apply jumper to provide a 3.3-V bias to board from USB-to-GPIO adapter.
If needed, use this jumper to provide 3.3VD to application board.

TP37
10.0k
R35
10.0k
R32
10.0k
R33
10.0k
R37
10.0k
R38
0
R34

Figure 2. UCD3138ACCEVM149 Schematic (2 of 3)
Figure 3. UCD3138ACCEVM149 Schematic (3 of 3)
5 Test Equipment

5.1 Operating System
Microsoft Windows XP (32-bit), or Vista (32-bit), or Windows 7 (32-bit).

5.2 USB-to-GPIO Interface Adapter
This adapter is to establish the communication between the control card UCD3138ACCEVM149 and the PC computer through the PMBus and the GUI, Texas Instruments Fusion Digital Power Designer. To order the USB-to-GPIO adaptor, visit: http://www.ti.com(tool/usb-to-gpio

5.2.1 USB-to-GPIO Interface Adapter (HPA172)
Accessories including:
(a) USB interface adapter (HPA172).
(b) USB cable, 5-pin B Mini Male to Type A Male.
(c) Ribbon cable, socket-to-socket, 10-pin, 2-headers, polarized.

![USB-to-GPIO Interface Adapter (HPA172)](image)

Figure 4. USB-to-GPIO Interface Adapter (HPA172)

5.3 Oscilloscope
An oscilloscope of analog or digital type is capable of 200-MHz bandwidth with an appropriate accompanying oscilloscope probe.
6 **Equipment Setup**

6.1 **GUI (Graphical User Interface)**

6.1.1 **File for Installation**

The GUI installation file is `TI-Fusion-Digital-Power-Designer-Version-2.0.16.exe` or newer version. To obtain the latest version of GUI, visit [http://www.ti.com/tool/fusion_digital_power_designer](http://www.ti.com/tool/fusion_digital_power_designer)

6.1.2 **Installation**

Double click and launch the `.exe` file to start the installation. Click **Next** all the way through. When present, click **I accept the agreement** after reading it. Then click **Install**. After the installation, click **Finish** to exit setup. Then click **Exit Program**.

6.1.3 **Launch UCD3138A Device GUI**

The GUI for UCD3138ACCEVM149 board can be launched through the below steps:

1. Click the window **start** → **click All Programs** → **click Texas Instruments Fusion Digital Power Designer** → **click Device GUIs** → **click UCD3xxx & UCD9xxx Device GUI**.

6.2 **Hardware Setup**

6.2.1 **Setup Overview**

Shown in [Figure 5](figure5.png) is the connection between UCD3138ACCEVM149 and the PC computer through USB-to-GPIO Interface Adapter.

**USB Adapter Connection:**

1. Connect one end of the ribbon cable to the EVM (SV601149), and connect the other end to the USB interface adapter.
2. Connect the Mini USB connector of the USB cable to the USB interface adapter, and connect the other end to the USB port of the PC computer.

![Figure 5. UCD3138ACCEVM149 Test Connections](figure5.png)
Figure 6. UCD3XXX / UCD9XXX Device GUI

Figure 7. Firmware Code Downloading
# 6.3 List of Test Points

## Table 2. The Functions of Each Test Point

<table>
<thead>
<tr>
<th>Test Points</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP1</td>
<td>3.3VA</td>
<td>3.3-V analog on board</td>
</tr>
<tr>
<td>TP2</td>
<td>RC filter 2B</td>
<td>DPWM2B RC filter</td>
</tr>
<tr>
<td>TP3</td>
<td>RC filter 3A</td>
<td>DPWM3A RC filter</td>
</tr>
<tr>
<td>TP4</td>
<td>PWM-0</td>
<td>PWM0</td>
</tr>
<tr>
<td>TP5</td>
<td>AGND</td>
<td>Analog GND</td>
</tr>
<tr>
<td>TP6</td>
<td>DGND</td>
<td>Digital GND</td>
</tr>
<tr>
<td>TP7</td>
<td>PWM-1</td>
<td>PWM1</td>
</tr>
<tr>
<td>TP8</td>
<td>EADC-N0</td>
<td>EAN0</td>
</tr>
<tr>
<td>TP9</td>
<td>EADC-P1</td>
<td>EAP1</td>
</tr>
<tr>
<td>TP10</td>
<td>EADC-P0</td>
<td>EAP0</td>
</tr>
<tr>
<td>TP11</td>
<td>EADC-N1</td>
<td>EAN1</td>
</tr>
<tr>
<td>TP12</td>
<td>DPWM-0A</td>
<td>DPWM0A</td>
</tr>
<tr>
<td>TP13</td>
<td>DPWM-0B</td>
<td>DPWM0B</td>
</tr>
<tr>
<td>TP14</td>
<td>DPWM-1A</td>
<td>DPWM1A</td>
</tr>
<tr>
<td>TP15</td>
<td>DPWM-1B</td>
<td>DPWM1B</td>
</tr>
<tr>
<td>TP16</td>
<td>TCAP</td>
<td>TCAP</td>
</tr>
<tr>
<td>TP17</td>
<td>DPWM-2A</td>
<td>DPWM2A</td>
</tr>
<tr>
<td>TP18</td>
<td>DPWM-2B</td>
<td>DPWM2B</td>
</tr>
<tr>
<td>TP19</td>
<td>DPWM-3A</td>
<td>DPWM3A</td>
</tr>
<tr>
<td>TP20</td>
<td>DPWM-3B</td>
<td>DPWM3B</td>
</tr>
<tr>
<td>TP21</td>
<td>AD-00</td>
<td>A to D converter channel AD01</td>
</tr>
<tr>
<td>TP22</td>
<td>EADC-N2</td>
<td>EAN2</td>
</tr>
<tr>
<td>TP23</td>
<td>EADC-P2</td>
<td>EAP2</td>
</tr>
<tr>
<td>TP24</td>
<td>AD-01</td>
<td>A to D converter channel AD00</td>
</tr>
<tr>
<td>TP25 to TP36</td>
<td>AD-02 to -13</td>
<td>A to D converter channels AD02 to AD13</td>
</tr>
<tr>
<td>TP37</td>
<td>12V_EXT</td>
<td>External 12 V</td>
</tr>
<tr>
<td>J1</td>
<td>PMBus Connection</td>
<td>PMBus connector, 10 pins</td>
</tr>
<tr>
<td>J2</td>
<td>3.3VD</td>
<td>Jumper header, if jump across, 3.3 V supplied from USB connection</td>
</tr>
<tr>
<td>J3</td>
<td>Analog Connection</td>
<td>40-pin header, analog signals</td>
</tr>
<tr>
<td>J4</td>
<td>Digital Connection</td>
<td>40-pin header, digital signals</td>
</tr>
<tr>
<td>J5</td>
<td>JTAG Connection</td>
<td>14-pin header, JTAG connector</td>
</tr>
<tr>
<td>J6</td>
<td>3.3VD</td>
<td>Jumper header, if jump across, 3.3 V supplied to outside need</td>
</tr>
<tr>
<td>J7</td>
<td>TDI</td>
<td>Jump across to use JTAG</td>
</tr>
<tr>
<td>J8</td>
<td>TDO</td>
<td>Jump across to use JTAG</td>
</tr>
<tr>
<td>S1</td>
<td>Reset</td>
<td>UCD3138 reset, press to reset.</td>
</tr>
</tbody>
</table>
7 Test Procedure

7.1 Download Firmware Codes to UCD3138ACCEVM149

Set up the EVM connection based on Figure 5.
1. Set up the EVM connection based on Figure 5. The LED of USB adapter is light on.
2. Use provided jumper to jump across J2. The LED of the EVM will light up.
3. Launch the UCD3XXX / UCD9XXX Device GUI following the steps described in section 6.1.3. A window shown in Figure 6 appears.
4. Click Firmware Download; then a new window appears as shown in Figure 7. Click Select File and browse an intended firmware code file with file extension .x0 (eg. cyclone.x0), then click Download. The firmware of cyclone.x0 will be downloaded to the UCD3138A device on the UCD3138ACCEVM149 EVM. When prompted, click Yes to complete the download. Click Close to exit the download window.
5. After the firmware code downloads to the UCD3138A device, the intended test can be performed.

7.2 Erasing Firmware Code from UCD3138ACCEVM149

Erasing the downloaded firmware from the UCD3138A flash memory can be done by following the steps below and referencing Figure 6:
1. Click Device ID
2. Click Command Program to jump to ROM (SendByte 0xD9)
3. Click Set PFlash: 0xFF

7.3 Equipment Shutdown

1. Exit the GUI.
2. Disconnect the USB cable and the ribbon cable.
8 EVM Assembly Drawing and PCB Layout

Figure 8 through Figure 13 show the design of the UCD3138ACCEVM149 printed circuit board. PCB dimensions: L x W = 3.400 x 1.8 inch, PCB material: FR4 or compatible, four layers and 1oz copper on each layer.

Figure 8. UCD3138ACCEVM149 Top Layer Assembly Drawing (top view)

Figure 9. UCD3138ACCEVM149 Bottom Assembly Drawing (no components on this side)
Figure 10. UCD3138ACCEVM149 Top Copper (top view)

Figure 11. UCD3138ACCEVM149 Internal Layer 1 (top view)
Figure 12. UCD3138ACCEVM149 Internal Layer 2 (top view)

Figure 13. UCD3138ACCEVM149 Bottom Copper (top view)
9 List of Materials

The EVM components list according to the schematics shown in Figure 1, Figure 2 and Figure 3 are listed in Table 3.

Table 3. List of Materials

<table>
<thead>
<tr>
<th>QTY</th>
<th>DESIGNATOR</th>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
<th>MANUFACTURER</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>C1, C6, C32</td>
<td>Capacitor, ceramic, 1 µF, 16 V, ±10%, X5R, 0603</td>
<td>C0603C105K4PACTU</td>
<td>Kemet</td>
</tr>
<tr>
<td>7</td>
<td>C2–C5, C11, C13, C34</td>
<td>Capacitor, ceramic, 0.1 µF, 16 V, ±10%, X7R, 0603</td>
<td>C0603C105K4PACTU</td>
<td>Kemet</td>
</tr>
<tr>
<td>1</td>
<td>C7</td>
<td>Capacitor, ceramic, 1000 pF, 50 V, ±5%, C0G/NP0, 0603</td>
<td>C0603C105K4PACTU</td>
<td>TDK</td>
</tr>
<tr>
<td>16</td>
<td>C8, C14, C18–C31</td>
<td>Capacitor, ceramic, 33 pF, 50 V, ±5%, C0G/NP0, 0603</td>
<td>0603A330JAT2A</td>
<td>AVX</td>
</tr>
<tr>
<td>5</td>
<td>C9, C10, C15–C17</td>
<td>Capacitor, ceramic, 22 µF, 10 V, ±10%, X5R, 0603</td>
<td>C0603C225K8PACTU</td>
<td>Kemet</td>
</tr>
<tr>
<td>1</td>
<td>C12</td>
<td>Capacitor, ceramic, 10 µF, 10 V, ±10%, X5R, 0603</td>
<td>C0603C255K9PACTU</td>
<td>Kemet</td>
</tr>
<tr>
<td>3</td>
<td>C33</td>
<td>Capacitor, ceramic, 10 µF, 10 V, ±10%, X5R, 0805</td>
<td>C0805C106K9PACTU</td>
<td>Kemet</td>
</tr>
<tr>
<td>2</td>
<td>D1, D2</td>
<td>Diode, Schottky, 40 V, 0.3 A, SOT-23</td>
<td>BAT54AFILM</td>
<td>ST Microelectronics</td>
</tr>
<tr>
<td>1</td>
<td>D3</td>
<td>LED, green, SMD, 1.6 x 0.8 x 0.8 mm</td>
<td>LTST-C190GKT</td>
<td>Lite-On</td>
</tr>
<tr>
<td>1</td>
<td>J1</td>
<td>Header (shrouded), 100 mil, 5 x 2, gold, TH</td>
<td>5103308-1</td>
<td>TE Connectivity</td>
</tr>
<tr>
<td>4</td>
<td>J2, J6, J7, J8</td>
<td>Header, 100 mil, 2 x 1, tin, TH</td>
<td>PEC02SAAN</td>
<td>Sullins Connector Solutions</td>
</tr>
<tr>
<td>2</td>
<td>J3, J4</td>
<td>Receptacle, 2 mm, 20x2, R/A, TH</td>
<td>NPPN202FJFN-RC</td>
<td>Sullins Connector Solutions</td>
</tr>
<tr>
<td>1</td>
<td>J5</td>
<td>Header, 100 mil, 7 x 2, tin, TH</td>
<td>PEC07DAAN</td>
<td>Sullins Connector Solutions</td>
</tr>
<tr>
<td>0</td>
<td>R1–R4</td>
<td>Resistor, 0.5, 0.1 W, 0603</td>
<td>CRCW06030000Z0EA</td>
<td>Vishay-Dale</td>
</tr>
<tr>
<td>12</td>
<td>R5, R7–R9, R16–R20, R23, R25, R26</td>
<td>Resistor, 100 Q, 1%, 0.1 W, 0603</td>
<td>CRCW0603100RFKEA</td>
<td>Vishay-Dale</td>
</tr>
<tr>
<td>3</td>
<td>R6, R34, R36</td>
<td>Resistor, 0 Q, 5%, 0.1 W, 0603</td>
<td>CRCW06030000Z0EA</td>
<td>Vishay-Dale</td>
</tr>
<tr>
<td>6</td>
<td>R10, R32, R33, R35, R37, R38</td>
<td>Resistor, 10.0 kΩ, 1%, 0.1 W, 0603</td>
<td>CRCW0603100RFKEA</td>
<td>Vishay-Dale</td>
</tr>
<tr>
<td>1</td>
<td>R11</td>
<td>Resistor, 16.0 kΩ, 1%, 0.1 W, 0603</td>
<td>RCD030FR-0716KL</td>
<td>Yageo America</td>
</tr>
<tr>
<td>1</td>
<td>R12</td>
<td>Resistor, 2.2 kΩ, 1%, 0.1 W, 0603</td>
<td>CRCW0603100RFKEA</td>
<td>Vishay-Dale</td>
</tr>
<tr>
<td>2</td>
<td>R13, R14</td>
<td>Resistor, 5.6 kΩ, 1%, 0.1 W, 0603</td>
<td>CRCW0603100RFKEA</td>
<td>Vishay-Dale</td>
</tr>
<tr>
<td>1</td>
<td>R15</td>
<td>Resistor, 100 kΩ, 1%, 0.1 W, 0603</td>
<td>CRCW0603100RFKEA</td>
<td>Vishay-Dale</td>
</tr>
<tr>
<td>6</td>
<td>R21, R22, R24, R27–R29</td>
<td>Resistor, 2.0 kΩ, 5%, 0.1 W, 0603</td>
<td>CRCW0603200K0JNEA</td>
<td>Vishay-Dale</td>
</tr>
<tr>
<td>1</td>
<td>R30</td>
<td>Resistor, 0.5 Q, 1%, 0.1 W, 0603</td>
<td>RR030FR-070RSL</td>
<td>Yageo America</td>
</tr>
<tr>
<td>1</td>
<td>R31</td>
<td>Resistor, 301 Q, 1%, 0.1 W, 0603</td>
<td>CRCW0603301RFKEA</td>
<td>Vishay-Dale</td>
</tr>
<tr>
<td>1</td>
<td>R39</td>
<td>Resistor, 10.0 Q, 1%, 0.125W, 0805</td>
<td>CRCW0805100RFKEA</td>
<td>Vishay-Dale</td>
</tr>
<tr>
<td>1</td>
<td>S1</td>
<td>Switch, tactile, SPST-NO, 1VA, 32 V, 6.3 x 5.36 x 6.6 mm, SMT</td>
<td>KT11P2J3M4LFS</td>
<td>C&amp;K Components</td>
</tr>
<tr>
<td>1</td>
<td>SH-H1</td>
<td>Shunt, 100 mil, flash gold, black, 1 x 2, Closed Top</td>
<td>SPC025YAN</td>
<td>Sullins Connector Solutions</td>
</tr>
<tr>
<td>16</td>
<td>TP1–TP4, TP6, TP7, TP12–TP20, TP37</td>
<td>Test point, miniature, white, TH</td>
<td>S002</td>
<td>Keystone</td>
</tr>
<tr>
<td>1</td>
<td>TP5</td>
<td>Test point, compact, black, TH</td>
<td>S006</td>
<td>Keystone</td>
</tr>
<tr>
<td>1</td>
<td>U1</td>
<td>Highly Integrated Digital Controller for Isolated Power, RGC0064B</td>
<td>UCD3138ARGC</td>
<td>Texas Instruments</td>
</tr>
<tr>
<td>1</td>
<td>U2</td>
<td>Single Output LDO, 80 mA, fixed 3.3 V output, 2.5 to 24 V input, with low IQ, 8-pin SON (DRB), –40°C to 125°C, Green (RoHS &amp; no Sb/Br)</td>
<td>TPS715A33DBR</td>
<td>Texas Instruments</td>
</tr>
<tr>
<td>0</td>
<td>FID1–FID3</td>
<td>Fiducial mark. There is nothing to buy or mount.</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>0</td>
<td>TP8–TP11, TP21–TP36</td>
<td>Test Point, Miniature, White, TH</td>
<td>S002</td>
<td>Keystone</td>
</tr>
<tr>
<td>1</td>
<td>PCB</td>
<td>Printed Circuit Board</td>
<td>SV061149</td>
<td>Any</td>
</tr>
</tbody>
</table>
10 References

In this appendix, the basic steps of how to use Code Composer Studio v6 to compile firmware for UCD3138 family of devices is described. A design flow is described while detailed steps for firmware code creation, and firmware debugging along with hardware are obviously beyond the scope of this user’s guide and this appendix.

A.1 Importing a CCSv6 project

Upon running CCSv6 for the first time, the Workspace Launcher window will appear as shown in Figure 14. It is left to the user do decide whether or not to use a workspace, where it is located, and/or to check the box that says Use this as the default and do not ask again. For this guide, a workspace will not be used, so click OK.

Figure 14. CCSv6 Workspace Launcher
When the main window opens, click **Project** in the top navigation menu, then choose **Import CCS Project...** as shown in window as shown in **Figure 15**.

![Figure 15. Import Existing CCS Project](image)

This will open the window shown in **Figure 16**. Under **Select-search directory**, click **Browse**, navigate to the target project, and click **OK**. For this example, the project is called **UCD3138_Lab_02_solution**. Check the box next to the discovered project, and do not check **Copy projects into workspace**, or **Automatically import referenced projects**. Click **Finish**.

![Figure 16. Importing a CCSv6 Project](image)
The project should be imported into CCSv6 and should be shown in the Project Explorer as shown in Figure 17. At this point, files in the project can be edited as required.

![Figure 17. Project Explorer](image)

**A.2 Build/Compile a Project using Code Composer Studio v6**

For the UCD3138 family of devices, compiling a project produces an Intel-hex (.x0) firmware file that can be downloaded to, and run on the UCD3138 or related target device using the UCDXXX / UCD9XXX Device GUI (part of the Fusion Design Online software from TI).

After finished editing the project files, Right-Click on the project in the Project explorer, and choose Build Project.

---

**NOTE:** If this is the first time building a UCD3138 or related project, and Cygwin is also installed on the PC that is performing the compilation, the instructions in Section 3.3 of the Application Note entitled "Converting UCD3138 Firmware Project from Code Composer Studio Version 3.3 to 6.0" must be followed. Mainly, the C:\CYGWIN or other similarly named directory must be renamed temporarily during this first build. This will allow the new ARM library to be built properly. After this first build, the CYGWIN directory can be rolled back to its original name, and future builds can compile successfully.
Build/Compile a Project using Code Composer Studio v6

Builds may take up to a minute to compile, or longer for a first time build. Figure 18 shows the state of a successful build:

![Figure 18. Successful Build of UCD3138 Related Source Code](image)

When the build has finished, the .x0 file should be created and will be placed in the project directory’s debug folder. The filename that prefaces the .x0 will be the name of the project that was built (i.e. a project named UCD3138_Lab_02_solution will create UCD3138_Lab_02_solution.x0 as its firmware file). However, it must be noted that the project name must have no spaces, otherwise the .x0 file will not be generated.

This .x0 file can be and run on the UCD3138 target device using the UCD3XXX / UCD9XXX Device GUI.
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3.1.1 *Notice applicable to EVMs not FCC-Approved:*

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3.1.2 *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**

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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.

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.

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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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http://www.tij.co.jp/sds/ti_ ja/general/eStore/notice_01.page

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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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