# Stellaris® Intelligent Display Module (IDM) RDK

Stellaris reference design kits (RDKs) from Texas Instruments accelerate product development by providing ready-to-run hardware, example software, and comprehensive documentation including hardware design files. The Intelligent Display Module (IDM) is a highly integrated QVGA touch-panel module for automation and instrumentation applications. The compact design is based on the LM3S6918 Stellaris microcontroller. A key feature of the IDM is the Power over Ethernet (PoE) power system that facilitates both network and power connections with a single CAT5 cable. The 10/100 Ethernet capability connects the IDM to an array of networks – from dedicated industrial networks to the internet. The example application includes source code for an embedded web server. Development of software for the IDM is simplified by using the StellarisWare® comprehensive graphics library and ARM development tools from our tools partners.

Installing and Using the IDM RDK

Kit Contents

The IDM RDK includes the following items:

- Intelligent QVGA Touch Panel with Ethernet
- Wall adapter $24V_{dc}$ 15W with plug adapters for US, UK, EU, and Australia
- JTAG debug adapter (20-pin to 10-pin)
- Retractable Ethernet cable
- Reference Design Kit CD containing this Quickstart Guide, a User's Manual, example source code, graphics library, and hardware design files
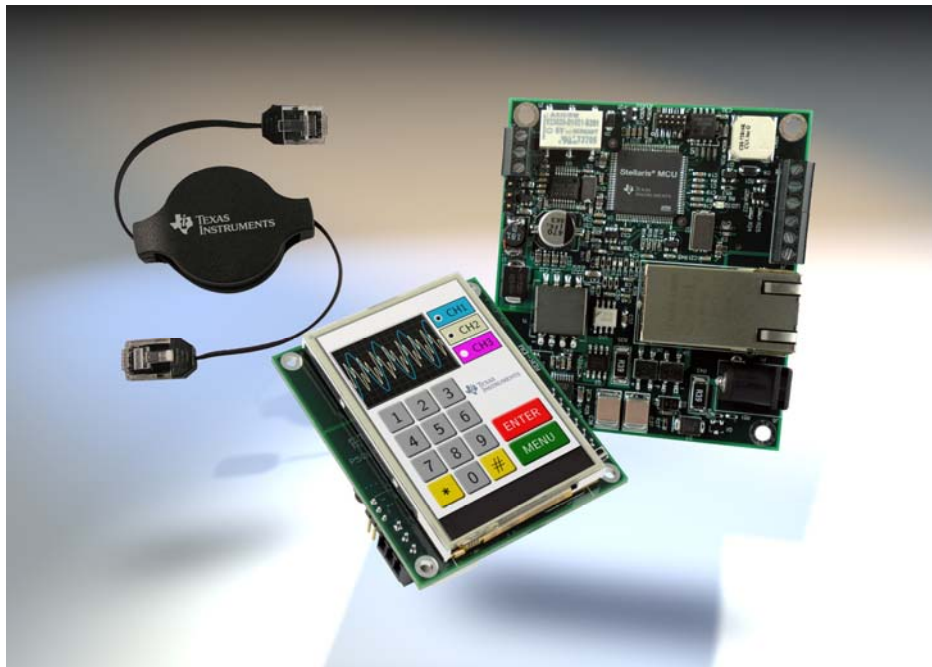
Quickstart Application

The IDM RDK comes preprogrammed with a quickstart application. Once you have powered the board, this application runs automatically. The application provides a security keypad to allow access to a door. The relay output is momentarily toggled upon entry of the access code to activate an electric door strike, unlocking the door. A demonstration of the Stellaris Graphics Library is also included within the application.

Upon startup, the screen is blank and the hint at the bottom says to touch the screen. Press the screen to bring up the keypad, which is randomized as an added security measure. The current access code is provided in the hint at the bottom of the screen.

Enter the access code and then press the '#' key to end the code entry. If the correct access code is entered, the relay output toggles momentarily, as indicated by the hint at the bottom of the screen, and the screen goes blank. Touch the screen again to repeat the process. If an incorrect access code is entered, the screen goes blank and waits for another access attempt.

A simple web server is provided to allow the access code to be changed. After booting, the software attempts to contact a DHCP server to allocate an IP address. If this does not succeed, a link local address of the form 169.254.xx.xx is allocated using the AUTOIP protocol as defined in RFC3927. Once an IP address is assigned, it is displayed at the bottom of the screen allowing the user to connect to the IDM's web server using a standard browser. The web page shows the current access code and provides a form for updating the access code.

If a micro-SD card is present, the access code is stored in a file called "key.txt" in the root directory. This file is written whenever the access code is changed, and is read at startup to initialize the access code. If a micro-SD card is not present or the "key.txt" file does not exist, the access code defaults to 6918.

Running the Quickstart Application

Follow these steps to start running the quickstart application preprogrammed into the IDM.

If a Power over Ethernet hub or switch is available, network and power connections to the IDM require only a single CAT5 cable connection. The IDM has been tested with a D-Link DES-1008PA 8-port switch, but any IEEE802.3af-compliant hub or switch will work.

If a PoE hub or switch is not available, use the wall adapter included in the kit as follows:

1. Select the appropriate plug adapter to apply power (the RDK includes plugs for most countries) and slide it into the wall adapter. If necessary, the adapter can be removed by pressing the release latch.

2. Plug the DC plug into the power socket on the IDM.

3. Connect the wall adapter to a standard AC electrical outlet (115 V or 230 V).

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# IDM RDK README FIRST

Using the Touch Panel

1. Touch the screen and the keypad appears.

2. Enter the access code provided in the hint at the bottom of the screen followed by the '#' key.

3. The hint at the bottom of the screen indicates that the relay output has been toggling unlocking the door.

Using the Web Server

1. Connect the Ethernet cable provided in the kit to the IDM.

2. Connect the other end of the Ethernet cable directly to your PC or LAN.

3. Power cycle the board by removing the plug and reinserting it into the power socket of the IDM.

4. The IDM attempts to locate a DHCP server when the board is first powered up. If the board is connected to a LAN and there is a DHCP server present, the board attempts to obtain an IP address from the DHCP server. If an IP address is obtained, then it will be displayed on the screen and you can move on to step 6. After a short period of time, if no DHCP server is found, the IDM uses the AUTOIP protocol to pick a link local IP address of the form 169.254.xx.xx. If you have connected the IDM to a LAN but an IP address could not be obtained from a DHCP server, it is recommended to go back to step 2 and connect the IDM directly to your PC.

5. If you have connected the IDM directly to your PC, your machine automatically detects the correct IP address and subnet settings after several seconds.

   In some cases, you need to manually configure your PC's IP address and subnet mask. To do this, disable the machine's wireless network connection and any other internet connections that could interfere with the network being created. Select the Internet Protocol (TCP/IP) connection within the Local Area Connection Properties and click on Properties. Next, manually configure your IP address to 169.254.19.60 and your subnet mask to 255.255.0.0, as shown below.
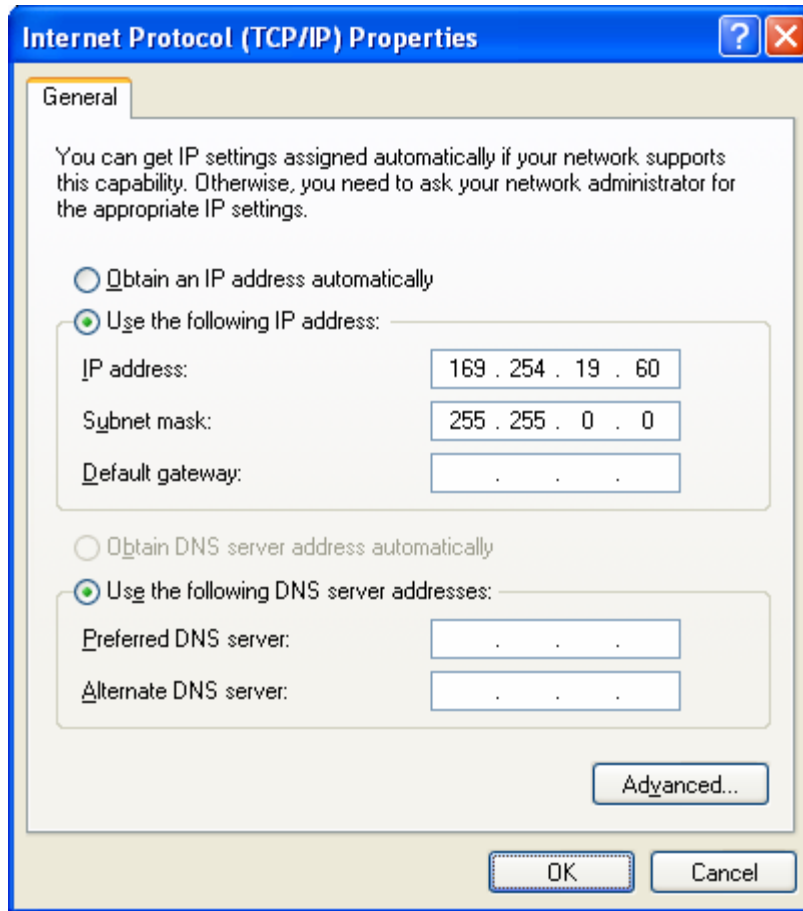
The integrated PHY on the LM3S6918 has an Auto-MDX feature which allows you to use a straight-through or cross-over Ethernet cable.

6. To access the board's web page, simply type the IP address into the address bar of your host's web browser and the web page loads from the IDM. For example, if the default IP address, 169.254.19.60, is used, type http://169.254.19.60 into the web browser's address bar.

7. Type a new four digit access code into the appropriate box of the web page and click Submit.

8. The access code has now been changed. The new access code can be tested by touching the screen to bring up the keypad and entering the new code followed by the '#' key.

Accessing the Graphics Demonstration

1. Touch the screen and the keypad appears.

2. Press the "*" key twice. The display changes to show an introduction to the demonstration.

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3. Navigate through the various panels in the demonstration by pressing the "+" and "_" buttons at the bottom of the screen.

4. Exit back to the numeric keypad by pressing the "X" button found on the first and last demonstration panels.

StellarisWare®

A full set of C-based peripheral drivers is provided, covering all peripherals and functionality of the Stellaris devices. The StellarisWare package includes various example applications with project files for all major tool vendors that support Stellaris.

Installing StellarisWare

1. Insert the RDK Documentation and Software CD into the CD-ROM drive of your computer. If Autoplay is enabled on your PC, the index.htm file automatically opens in your default web browser. If not, use Windows Explorer or other browser to open the index.htm file manually.

2. From the CD menu, select the Software button. Click the 'Install' link for StellarisWare. If you prefer to manually install StellarisWare from a zip file, the zip file is located in the "\Software\StellarisWare" directory.

3. To view the StellarisWare documentation, navigate to the installation directory and click the *StellarisWare Peripheral Driver Library User's Guide* PDF file.

IDM Example Applications

StellarisWare includes several example applications for the IDM. If you installed StellarisWare to the default installation path of C:\StellarisWare, you can find the example applications for the IDM in "C:\StellarisWare\boards\rdk-idm".

Graphics Library

StellarisWare includes a graphics library which can be used for the IDM. If you installed StellarisWare to the default installation path C:\ StellarisWare, you can find the graphics library in "C:\ StellarisWare\grlib".

LM Flash Programmer Utility

This Windows application may be used to flash application or boot loader images to the IDM board either via Ethernet or using another Stellaris evaluation kit board as a USB-to-JTAG/SWD adapter. It can be installed from the RDK-IDM CD and launched from the shortcut found in Start/All Programs/Luminary Micro/LM Flash Programmer.

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Conclusion

You have now successfully operated the Intelligent Display Module (IDM) using the touch panel and web server. From here we recommend reading the *Intelligent Display Module (IDM) Reference Design Kit User's Manual*, which explains how to use the IDM in more detail. Once you have completed that step, you will be prepared to start adapting the software and hardware for a specific application.

References

The following references are included on the IDM RDK documentation CD and are also available for download at www.luminarymicro.com:

- *Intelligent Display Module (IDM) Reference Design Kit User's Manual*, publication number RDK-IDM-UM

- *Intelligent Display Module (IDM) Motor RDK Software Reference Manual,* publication number RDK-IDM-srm

- *StellarisWare Graphics Library User's Guide*, publication number SW-GRL-UG

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