



ISELED[®] Development Platform User's Guide

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Preface

NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our website (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a “DS” number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is “DSXXXXXXXXA”, where “XXXXXXXX” is the document number and “A” is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE online help. Select the Help menu, and then Topics, to open a list of available online help files.

DOCUMENT LAYOUT

This guide contains the following sections:

- **Chapter 1. “The ISELED® Development Platform”**
- **Chapter 2. “Hardware”**
- **Chapter 3. “Software”**
- **Chapter 4. “Troubleshooting Common Problems”**
- **Chapter 5. “Appendix”**

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	<i>MPLAB® IDE User's Guide</i>
	Emphasized text	...is the <i>only</i> compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
All caps	An operating mode, alarm state, status, or chassis label	ALARM
Quotes	A field name in a window or dialog	“Save project before build”
Underlined, italic text with right angle bracket	A menu path	<u><i>File>Save</i></u>
Bold characters	A dialog button	Click OK
	A tab	Click the Power tab

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DOCUMENTATION CONVENTIONS

N'Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4'b0010, 2'hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
Courier New font:		
Plain Courier New	Sample source code	#define START
	Filenames	autoexec.bat
	File paths	c:\mcc18\h
	Keywords	_asm, _endasm, static
	Command-line options	-Opa+, -Opa-
	Bit values	0, 1
	Constants	0xFF, 'A'
Italic Courier New	A variable argument	<i>file.o</i> , where <i>file</i> can be any valid filename
Square brackets []	Optional arguments	mcc18 [options] <i>file</i> [options]
Curly brackets and pipe character: { }	Choice of mutually exclusive arguments; an OR selection	errorlevel {0 1}
Ellipses...	Replaces repeated text	var_name [, var_name...]
	Represents code supplied by user	void main (void) { ... }

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- **General Technical Support** – Frequently Asked Questions (FAQs), technical support requests, online discussion groups, Microchip consultant program member listing
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- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the website at:
<http://www.microchip.com/support>.

DOCUMENT REVISION HISTORY

Revision A (November 2020)

- Initial release of this document.

Revision B (March 2022)

- Updated **Chapter 1. “The ISELED® Development Platform”**
- Updated **Chapter 2. “Hardware”**
- Made minor editorial corrections

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NOTES:



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Chapter 1. The ISELED® Development Platform

1.1 INTRODUCTION

The Microchip ISELED® Development Platform provides a modular environment for rapid prototyping and evaluation of automotive ambient lighting applications that adhere to the ISELED Smart LED standard. ISELED stands for Integrated Smart Embedded LEDs as defined by the ISELED Alliance. ISELED integrates an RGB LED and the LED controller all in one module. LEDs are calibrated during production and all calibration data is stored within the LED module, not the target MCU. ISELED devices use a simple, 2-wire communication interface where up to 4,079 LEDs can be daisy-chained together in series.

Note: For more details about ISELED and the standard, visit www.iseled.com.

1.2 DEVELOPMENT PLATFORM REQUIREMENTS

The ISELED Development Platform is comprised of multiple components. The required hardware is listed below:

- Development Platform Controller Board. Select one of the following:
 - Curiosity HPC Development Board (PN: DM164136)
 - a) Target MCU (Controller Board):
PIC18F25K42. Replaces the default MCU (PIC16F18875) on the Curiosity HPC (PN: PIC18F25K42-I/SP)
 - ATSAMC21 Xplained Pro (PN: ATSAMC21-XPRO)
 - a) ATMBUSADAPTER-XPRO (PN: ATMBUSADAPTER-XPRO). Required for Controller to Interface Board connection.
 - dsPIC33C® Curiosity Development Board (PN: DM330030)
- ISELED Interface Board
 - mikroBUS™ Add-On Board Standard (PN: APG00112)
- ISELED Development Board (choose one):
 - Osram ISELED Development Board (PN: APG00113)
 - Dominant ISELED Development Board (PN: APG00114)
- USB Cable
 - Micro USB (PN: ATUSBMICROCABLE-XPRO)
- 7V Power Supply (Optional, 6-7V Max)
 - 7V, 110-220V, 1.3A, 2.5mm ID x 5.5mm OD
- Computer
 - Windows 7 or newer
 - High-speed USB port

Note: All hardware listed must be purchased separately from Microchip (new.microchipdirect.com) or from an approved distributor.

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Required Software:

For the ISELED software driver, contact your local sales or fill out the software inquiry form at www.microchip.com/iseled.

1.3 ISELED® DEVELOPMENT PLATFORM OVERVIEW

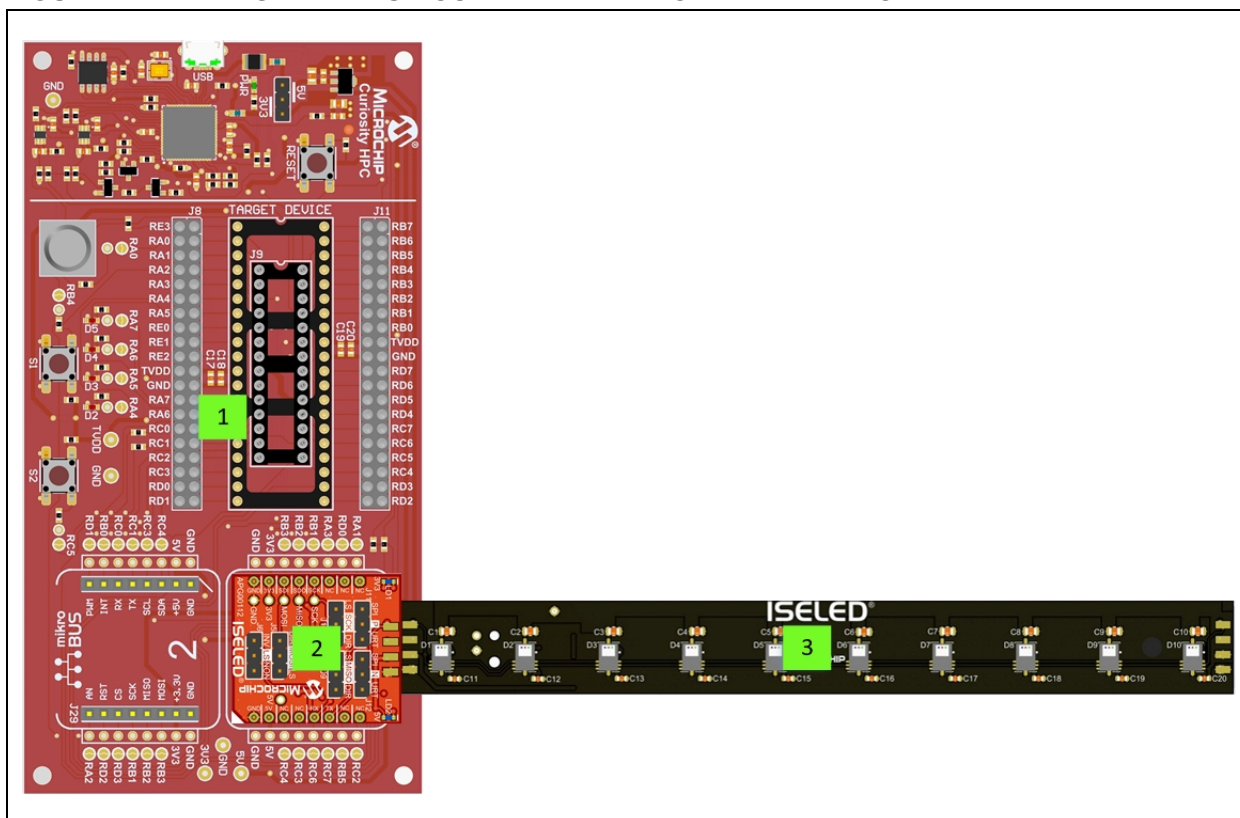
Three configurations for the ISELED Development Platform are presented in this User Guide. A Microchip PIC® MCU variant which utilizes the Curiosity HPC development board, the Microchip dsPIC33C® Curiosity development board and the Xplained Pro variant which uses the ATSAMC21-XPRO. The hardware components and default jumper configuration settings for each setup are summarized in the following sections.

1.3.1 ISELED Curiosity HPC Development Platform

The key hardware components for the ISELED Curiosity HPC Development Platform are listed below:

1. Curiosity HPC
 - a) Development board using the PIC18F25K42 target MCU.
2. ISELED Interface Board
 - a) Configuration interface and the gateway between the Curiosity HPC and the ISELED Development Board.
3. ISELED Development Board
 - a) Development board with 10 ISELED Smart LEDs.

FIGURE 1-1: ISELED® CURIOSITY HPC DEVELOPMENT PLATFORM

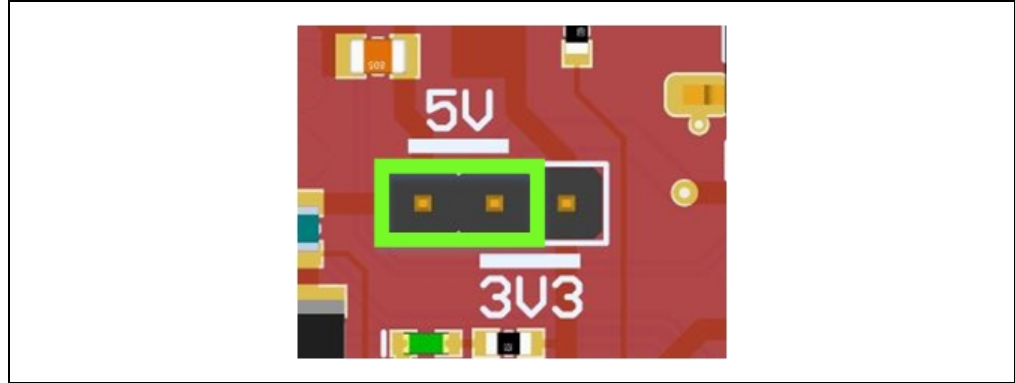


1.3.1.1 DEFAULT JUMPER SETTINGS

The default configuration for use with the demonstration firmware is as follows:

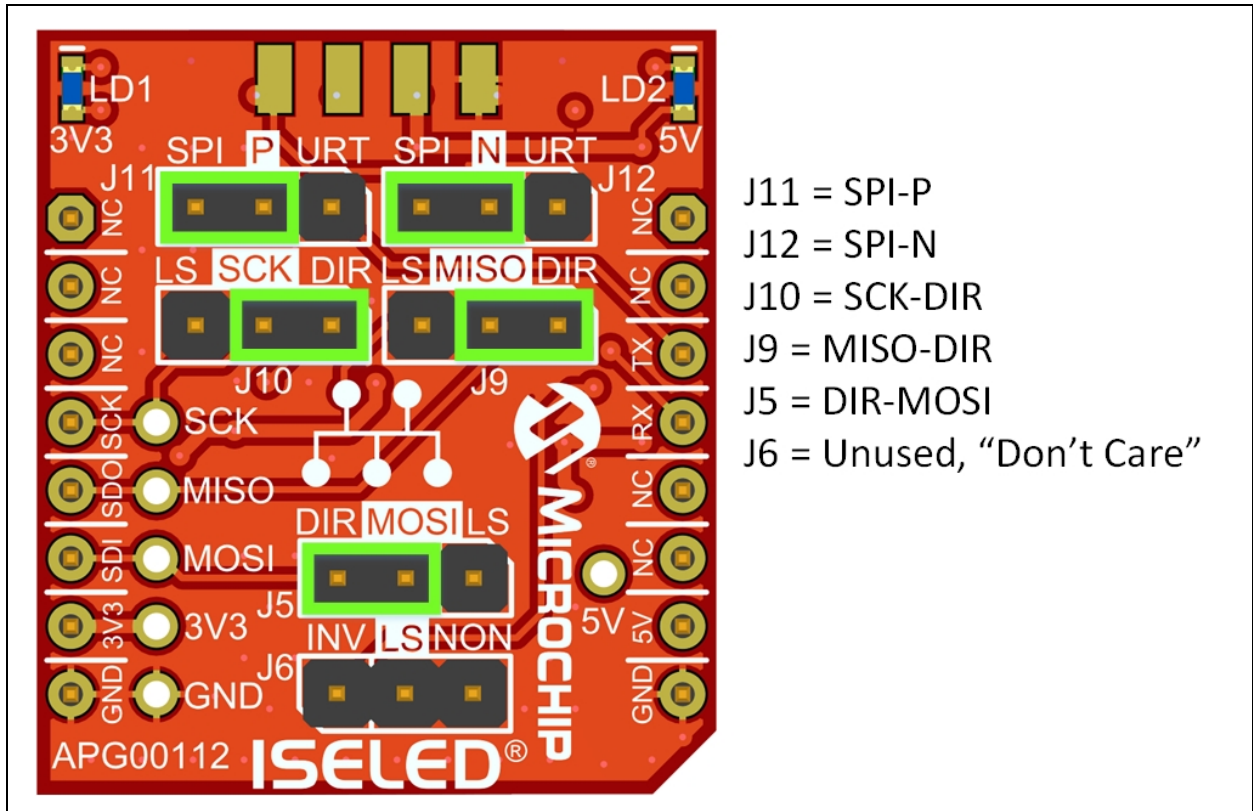
- Curiosity HPC
 - Replace the “Target Device” MCU with the PIC18F25K42.
 - Set the power supply jumper to 5V.

FIGURE 1-2: CURIOSITY HPC DEFAULT SUPPLY JUMPER SETTING



- ISELED Interface Board

FIGURE 1-3: CURIOSITY HPC ISELED® INTERFACE BOARD DEFAULT JUMPER SETTINGS

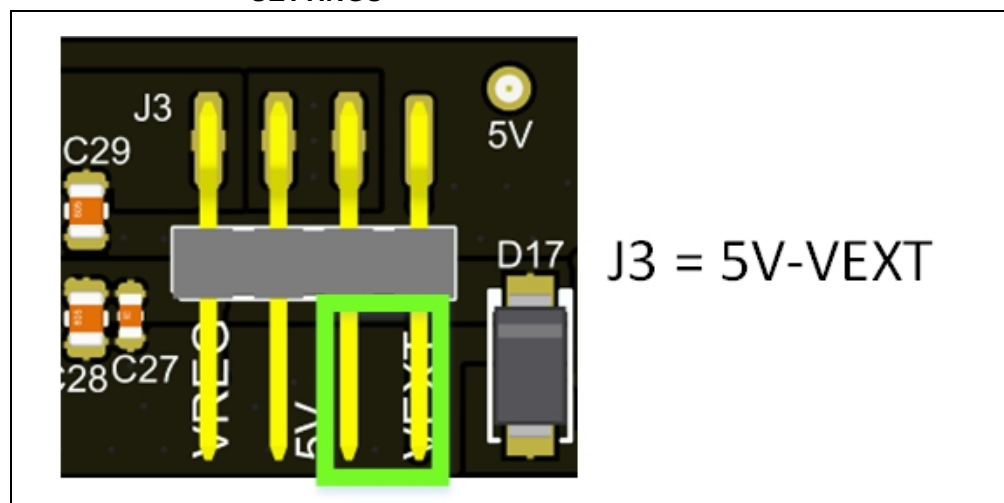


- J11 = SPI-P
- J12 = SPI-N
- J10 = SCK-DIR
- J9 = MISO-DIR
- J5 = DIR-MOSI
- J6 = Unused, “Don’t Care”

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- ISELED Development Board
 - Set the power supply jumper to 5V-VEXT.

FIGURE 1-4: ISELED® DEVELOPMENT BOARD DEFAULT JUMPER SETTINGS

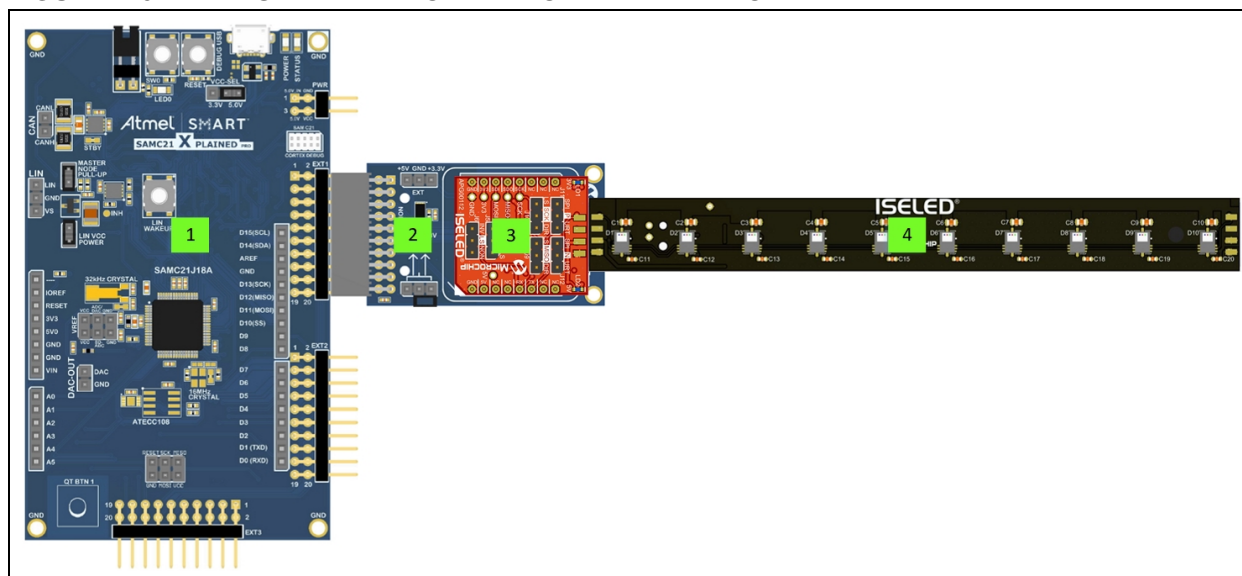


1.3.2 ISELED XPRO Development Platform

The key hardware components for the XPRO Development Platform are listed below:

1. ATSAMC21-XPRO
 - a) Development board using the SAMC21J18A-AUT target MCU.
2. ATMBUSADAPTER-XPRO
 - a) mikroBUS XPRO adapter board.
3. ISELED Interface Board
 - a) Configuration interface and the gateway between the Curiosity HPC and the ISELED Development Board.
4. ISELED Development Board
 - a) Development board with 10 ISELED Smart LEDs.

FIGURE 1-5: ISELED® XPRO DEVELOPMENT PLATFORM

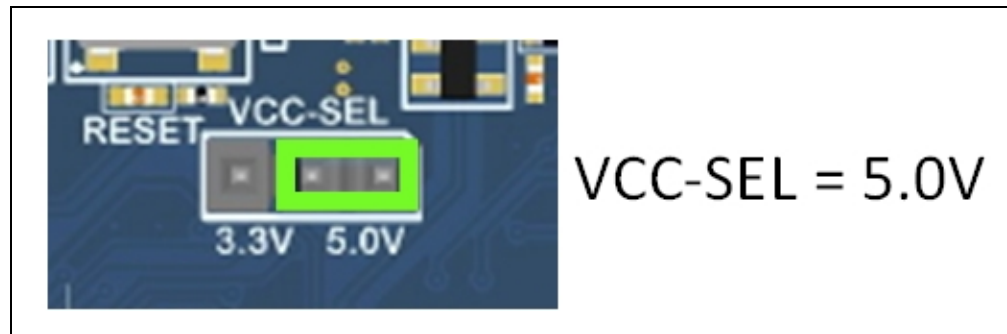


1.3.2.1 DEFAULT JUMPER SETTINGS

The default configuration for use with the demonstration firmware is as follows:

- SAMC21-XPRO
 - Set the power supply jumper, VCC-SEL, to 5.0V.

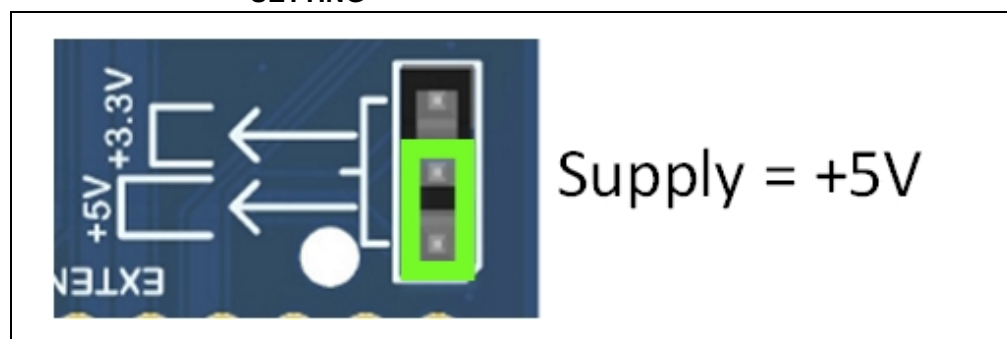
FIGURE 1-6: SAMC21 XPRO DEFAULT SUPPLY JUMPER SETTING



5. ATMBUSADAPTER-XPRO

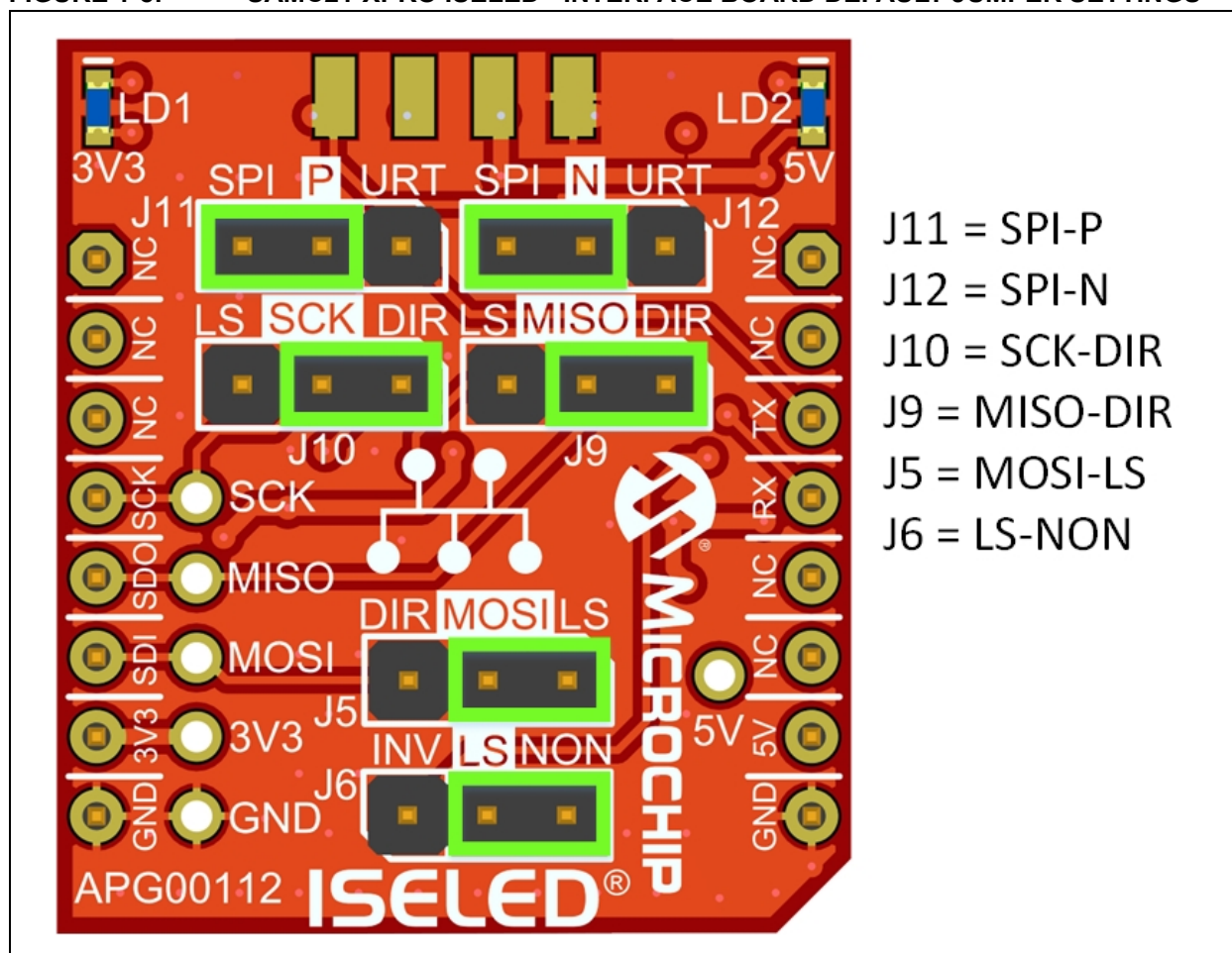
- Attach the ISELED Interface Board to the mikroBUS socket.
- Set the power supply jumper (NOT the power supply breakout header, EXT) to +5V.

FIGURE 1-7: ATMBUSADAPTER-XPRO DEFAULT SUPPLY JUMPER SETTING



- ISELED Interface Board

FIGURE 1-8: SAMC21-XPRO ISELED® INTERFACE BOARD DEFAULT JUMPER SETTINGS



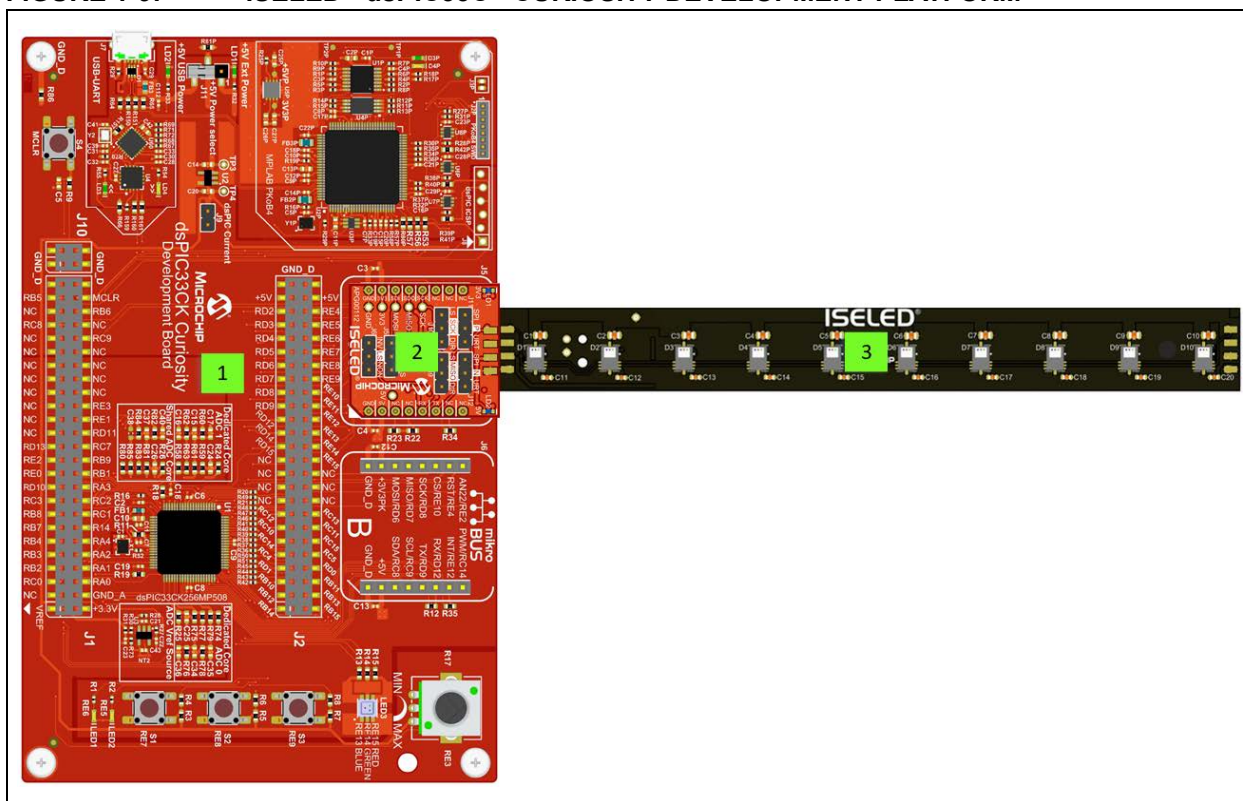
1.3.3 ISELED Curiosity dsPIC33C®

The key hardware components for the ISELED dsPIC33C Curiosity Development Platform are listed below:

1. dsPIC33C Curiosity Development Board
 - a) dsPIC33C Curiosity Development Board with the dsPIC33CK256MP508 single-core high performance DSC.
2. ISELED Interface Board
 - a) Configuration interface and the gateway between the dsPIC33C Curiosity and the ISELED Development Board.
3. ISELED Development Board
 - a) Development board with 10 ISELED Smart LEDs.

The ISELED® Development Platform

FIGURE 1-9: ISELED® dsPIC33C® CURIOSITY DEVELOPMENT PLATFORM



1.3.3.1 DEFAULT JUMPER SETTINGS

The default configuration for use with the demonstration firmware is as follows:

- dsPIC33C Curiosity
 - Set jumper, J11, to +5V USB Power.

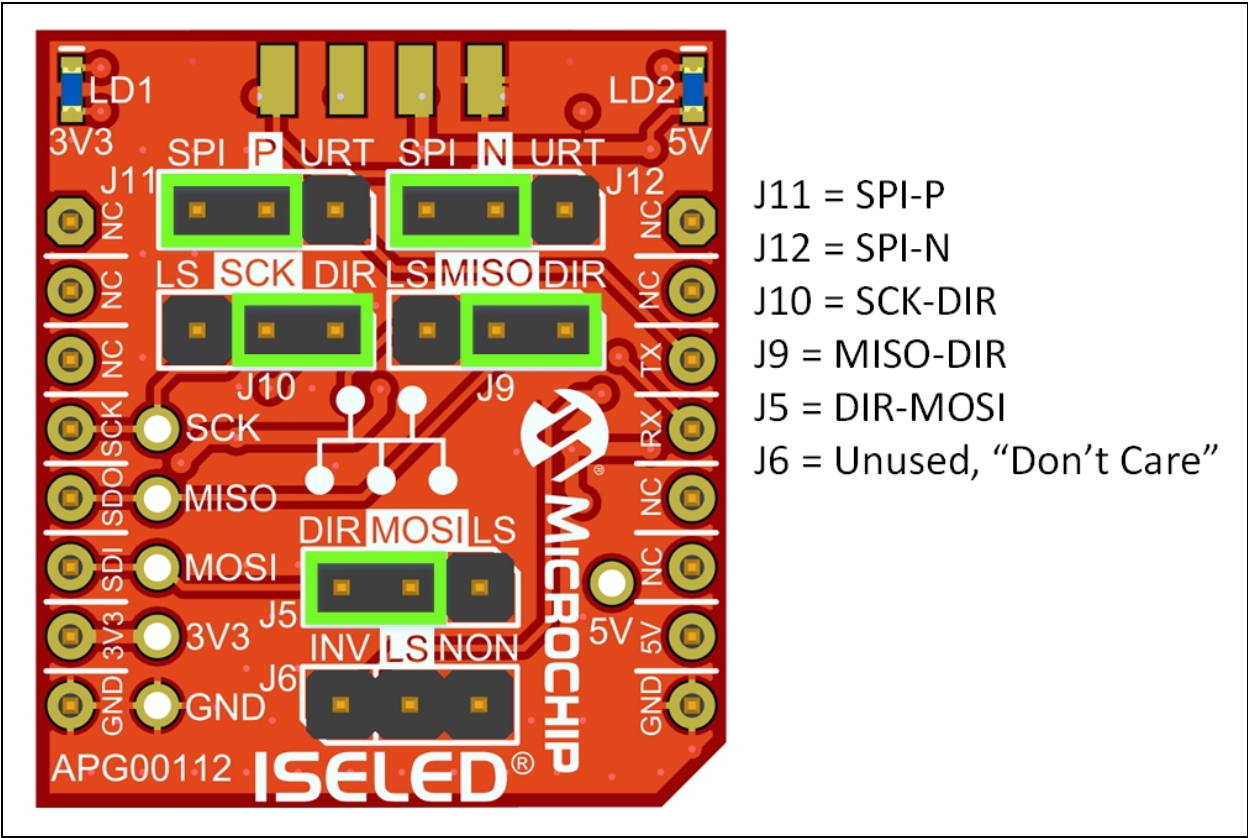
FIGURE 1-10: dsPIC33C® CURIOSITY POWER SUPPLY JUMPER SETTING



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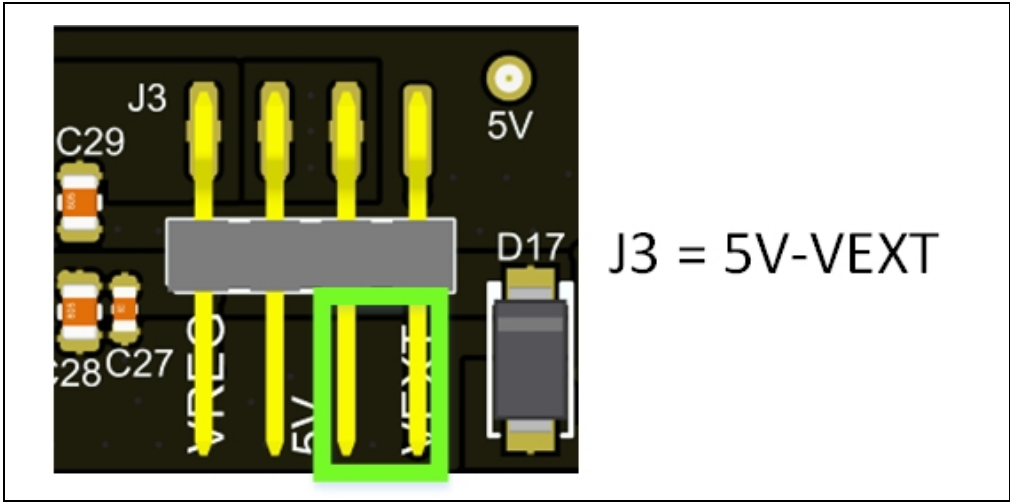
- ISELED Interface Board

FIGURE 1-11: dsPIC33C® CURIOSITY ISELED® INTERFACE BOARD DEFAULT JUMPER SETTINGS



- ISELED Development Board
 - Set the power supply jumper to 5V-VEXT.

FIGURE 1-12: ISELED® DEVELOPMENT BOARD DEFAULT JUMPER SETTINGS



Chapter 2. Hardware

2.1 HARDWARE FEATURES

The key features of the ISELED Development Platform are listed in the following sections.

2.1.1 Special Microcontroller Considerations

2.1.1.1 3.3V/5V OPERATION

The Microchip ISELED Development Platform is compatible with a multitude of microcontrollers ranging from 8-bit PIC MCUs to 32-bit ARM® MCUs. While the ISELED Smart LEDs require a 5V supply voltage, the ISELED Development Platform can operate at 3.3V or 5V, depending on the requirements of the host MCU.

2.1.2 ISELED Smart LED Driver

Each ISELED Smart LED utilizes a built-in, internal driver circuit to communicate with the master MCU. This driver, which is connected to the two ISELED bus pins, SIOP and SION, has the following characteristics:

1. 5V Supply Voltage
2. Idle-High
3. Open Drain
4. Bidirectional

Microchip's ISELED Interface Board (mikroBUS add-on board compatible) has been designed to fulfill these four criteria. The Interface Board functions as the bridge between the master MCU and the ISELED bus/driver.

The ISELED Interface Board can be configured to support a wide range of Microchip MCUs. Microchip's ISELED MCUs use either SPI or UART to generate the required ISELED communication protocol. Note that not all Microchip MCUs are ISELED compatible.

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2.1.2.1 ISELED INTERFACE BOARD USE CASE CONFIGURATION OVERVIEW

The table below provides a summary of the possible use cases supported by the various Microchip MCUs.

TABLE 2-1: ISELED® INTERFACE BOARD USE CASE CONFIGURATION OVERVIEW

Use Case	MCU I/O Characteristics			ISELED® Interface Board Configuration	Comments
	Idle State	Open Drain	Supply Voltage		
1	Idle High	Yes	5V or 3V ⁽¹⁾	J11: P-SPI J12: N-SPI J9: MISO-DIR J5: MOSI-DIR J10: SCK-DIR J6: Open	Configuration for the PIC18F and similar devices. Since the PIC18F's SPI is idle-high, has an open drain output and is bidirectional at 5V, no interface circuitry is required. Configure the ISELED® Interface Board for a direct connection between the MCU SPI I/O and the ISELED bus.
2	Idle High	No	5V	J11: P-SPI J12: N-SPI J9: MISO-DIR J5: MOSI-LS J10: SCK-DIR J6: LS-NON	Configuration for the SAMC21C and similar devices. The SAMC21's SPI is idle-high and bidirectional at 5V. However, because the SPI output is NOT open drain, configure the ISELED Interface Board to use the level shifter to convert the I/O to open drain.
3	Idle Low	Yes or No	5V	J11: P-SPI J12: N-SPI J9: MISO-DIR J5: MOSI-LS J10: SCK-DIR J6: LS-INV	Configuration for the dsPIC33, PIC24F and similar devices. These devices have an SPI that is idle-low. In this instance, the MOSI line must be inverted to force the signal to an idle-high state. Set J5 to MOSI-LS and J6 to LS-INV.
4	Idle High	No	3V	J11: P-SPI J12: N-SPI J9: MISO-LS J5: MOSI-LS J10: SCK-LS J6: LS-NON	Microchip devices that only support 3V operation, have an SPI that is idle-high and are not open drain. This set up makes use of level shifters (U2, U5 for 5V-to-3V and U3 for 3V-to-5V).
5	Idle Low	No	3V	J11: P-SPI J12: N-SPI J9: MISO-LS J5: MOSI-LS J10: SCK-LS J6: LS-INV	Microchip devices that only support 3V operation, have an SPI that is idle-low and are not open drain. This set up makes use of level shifters (U2 and U5) and an inverter (U4 also functions as 3V-5V shifter).
6	N/A	N/A	5V	J11: P-UART J12: N-UART J9, J5, J10, J6: Open	Most MCU UARTs are compatible with the ISELED driver interface. In this instance, there is no need for external interface circuitry. Set J11 and J12 to UART.

Note 1: Although the PIC18 devices are 3.3V and 5V compatible (selectable via the supply jumper on the Curiosity HPC board), 5V is the recommended operating voltage for most ISELED applications.

2.1.3 MCU Development Platform Options

2.1.3.1 CURIOSITY HPC AND THE PIC18F25K42

The ISELED Development Platform has been designed to be used in conjunction with the Curiosity HPC development board AND the PIC18F25K42 (target MCU). The Curiosity HPC supports both 3.3V and 5V MCU and ISELED Development Platform operation.

For more information concerning the Curiosity HPC, please refer to the following link: www.microchip.com/Developmenttools/ProductDetails/DM164136

FIGURE 2-1: CURIOSITY HPC

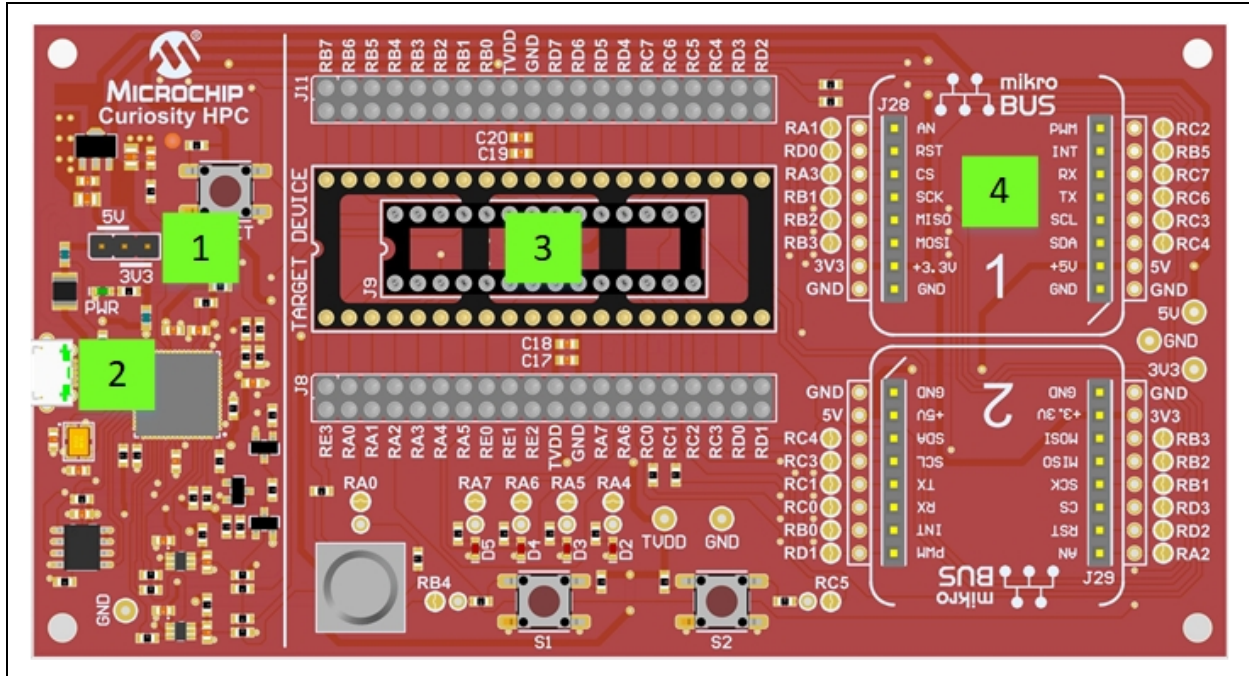


TABLE 2-2: CURIOSITY HPC KEY FEATURES

Number	Item	Description
1	MCU supply voltage selector	The Curiosity HPC can supply either 3.3V or 5V to the MCU via a selectable jumper. For this example, set the jumper to the 5V position.
2	Micro USB connector	Supply main for the development board. Connect the micro USB connector to the PC. Use MPLAB® X IDE to program the target MCU.
3	Target MCU	The ISELED® Development Platform requires the PIC18F25K42-I/SP (28-pin DIP). Please note that the PIC18F25K42-I/SP is NOT the default MCU (PIC16F18875) installed on the Curiosity HPC. The PIC18F25K42-I/SP must be purchased separately and installed prior to use.
4	mikroBUS™ Add-on Board standard interface	The MikroElektronika mikroBUS Add-on Standard provides the interface between the target MCU and the ISELED Interface/Development Boards. The ISELED Interface Board should be connected to mikroBUS position '1'.

2.1.3.2 ATSAMC21-XPRO AND ATMBUSADAPTER-XPRO

The ISELED Development Platform has been designed to be used in conjunction with the ATSAMC21-XPRO development board and the ATMBUSADAPTER-XPRO. The ATSAMC21-XPRO supports both 3.3V and 5V operation; however, it is highly recommended that the system be configured for 5V. This will avoid the necessity to include any “non-standard” supply connections between the ATSAMC21-XPRO and the ATMBUSADAPTER-XPRO.

For more information concerning the ATSAMC21-XPRO and the ATMBUSADAPTER-XPRO, please refer to the following links:

www.microchip.com/DevelopmentTools/ProductDetails/PartNO/ATSAMC21-XPRO

www.microchip.com/DevelopmentTools/ProductDetails/PartNO/ATMBUS-ADAPTER-XPRO

FIGURE 2-2: ATSAMC21-XPRO

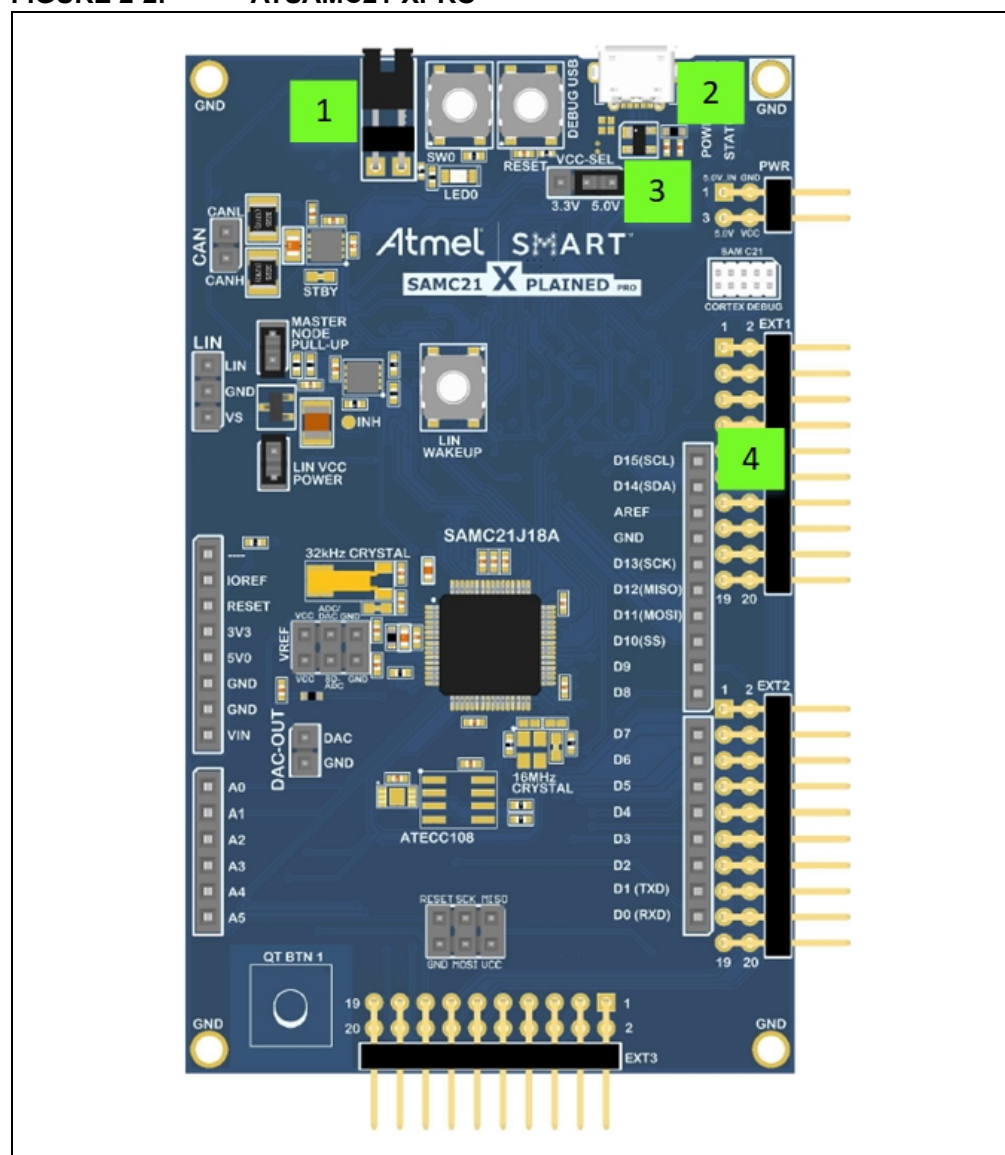


FIGURE 2-3: ATMBUSADAPTER-XPRO

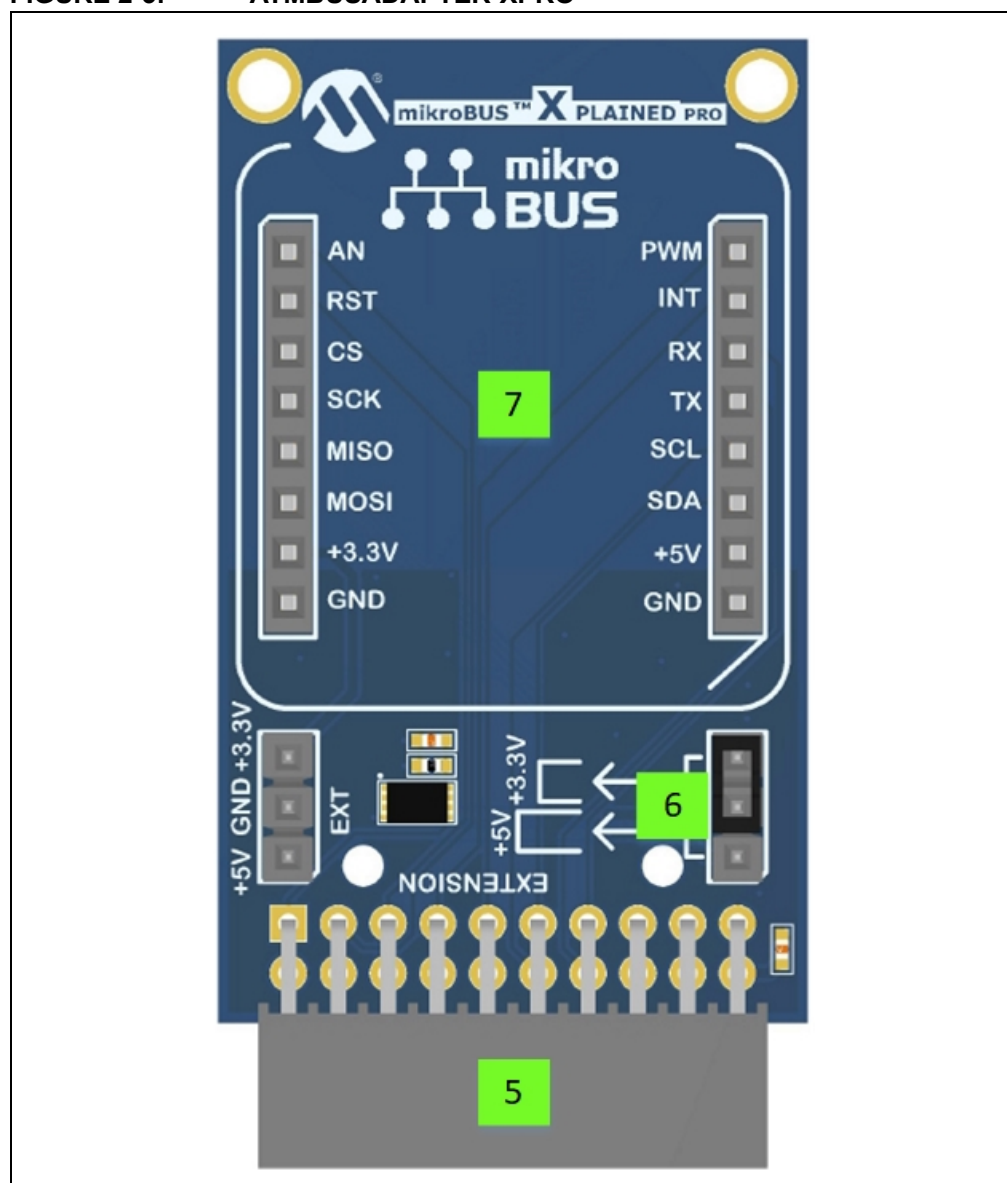


TABLE 2-3: ATSAMC21-XPRO AND ATMBUSADAPTER-XPRO KEY FEATURES

Number	Item	Description
1	MCU Power jumper	Used for current monitoring. Jumper MUST be installed for proper development board operation.
2	Debug USB interface	Supply main for the development board. Connect the micro USB connector to the PC. Use Atmel Studio to program the target MCU.
3	3.3V/5V supply selector (SAMC21)	The ATSAMC21-XPRO supports both 3.3V and 5V operation; however, it is highly recommended that system be configured for 5V. This will avoid the necessity to include any “non-standard” supply connections between the ATSAMC21-XPRO and the ATMBUSADAPTER-XPRO to accommodate a 3.3V MCU and a 5V ISELED® Development Board.
4	EXT header (SAMC21)	Connect the ATSAMC21-XPRO EXT1 to the ATMBUS-ADAPTER-XPRO EXT header.

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TABLE 2-3: ATSAMC21-XPRO AND ATMBUSADAPTER-XPRO KEY FEATURES (CONTINUED)

Number	Item	Description
5	EXT header (Adapter)	Supply main for the development board. Connect the micro USB connector to the PC. Use Atmel Studio to program the target MCU.
6	3.3V / 5V supply selector (Adapter)	The ATMBUSADAPTER-XPRO supports both 3.3V and 5V operation, however, it does NOT support both voltages simultaneously (without modification). This voltage is supplied directly by the EXT header which is connected to the ATSAMC21-XPRO MCU supply voltage. In order to avoid any "non-standard" supply connections between the ATSAMC21-XPRO and the ATMBUSADAPTER-XPRO, this jumper should be set to "5V".
7	mikroBUS™ Add-on header	The ISELED Interface Board is compatible with the MikroElektronika mikroBUS Add-on Board standard.

2.1.3.3 dsPIC33C CURIOSITY

The ISELED Development Platform has been designed to be used in conjunction with the dsPIC33C Curiosity development board.

For more information concerning the dsPIC33C Curiosity development board, please refer to the following link:

www.microchip.com/Developmenttools/ProductDetails/DM330030

FIGURE 2-4: dsPIC33C® CURIOSITY DEVELOPMENT BOARD

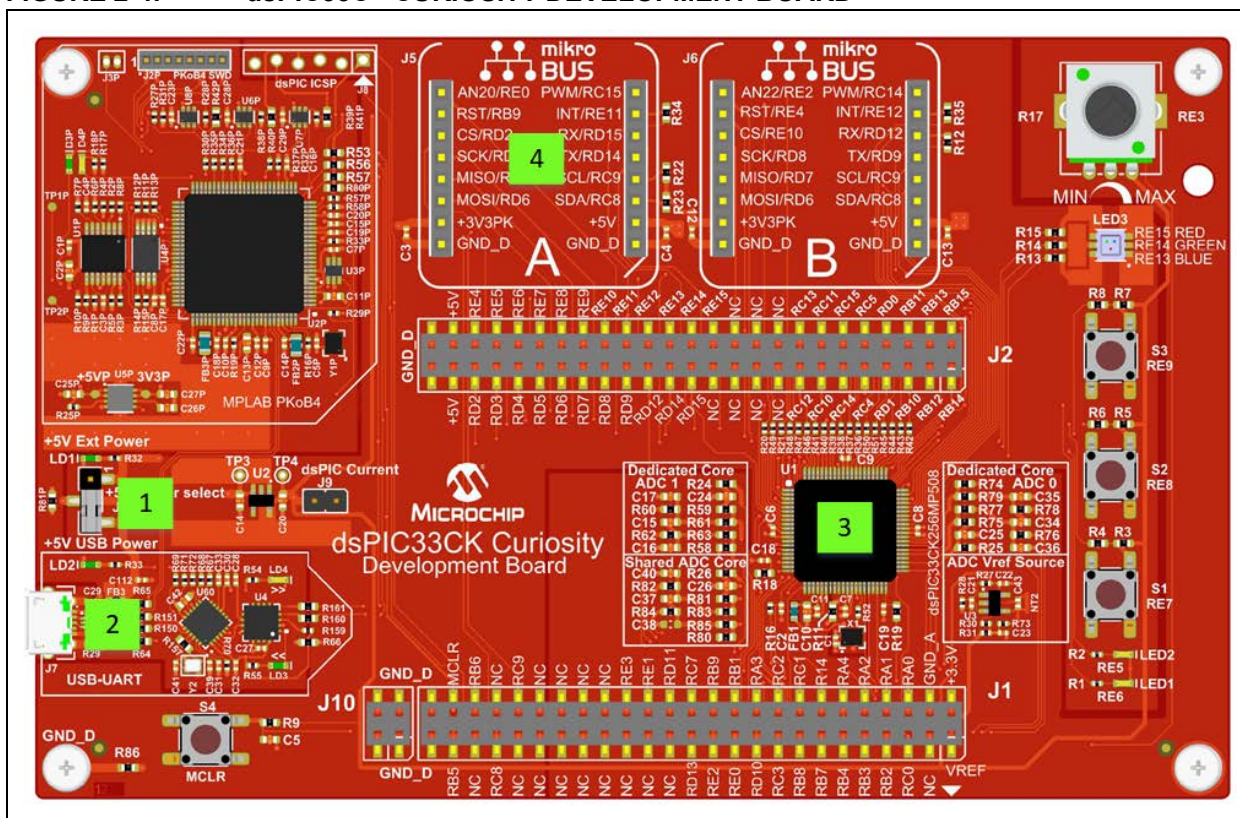


TABLE 2-4: dsPIC33C[®] CURIOSITY DEVELOPMENT BOARD KEY FEATURES

Number	Item	Description
1	Input supply selector	5V supply input from EXT Power or USB.
2	Micro-USB connector	Supply main for the development board. Connect the Micro-USB connector to the PC. Use MPLAB [®] X IDE to program the target MCU.
3	Target MCU	dsPIC33CK256MP508
4	mikroBUS [™] Add-on Board standard interface	The MikroElektronika mikroBUS Add-on Standard provides the interface between the target MCU and the ISELED [®] interface/Development Boards. The ISELED Interface Board should be connected to mikroBUS position 'A'.

2.1.4 ISELED Interface Board

The ISELED Interface Board is compatible with the MikroElektronika mikroBUS Add-on Board standard (see note below). It functions as the gateway between the ISELED Smart LED driver and the master MCU. The ISELED Interface Board contains several level shifters (5V-to-3V and 3V-to-5V) and inverter logic which allows the ISELED Development Board (presented in a later section) to operate with numerous Microchip MCUs. Also refer to [Table 2-1](#) ISELED[®] Interface Board Use Case Configuration Overview. The ISELED Interface Board is shown below.

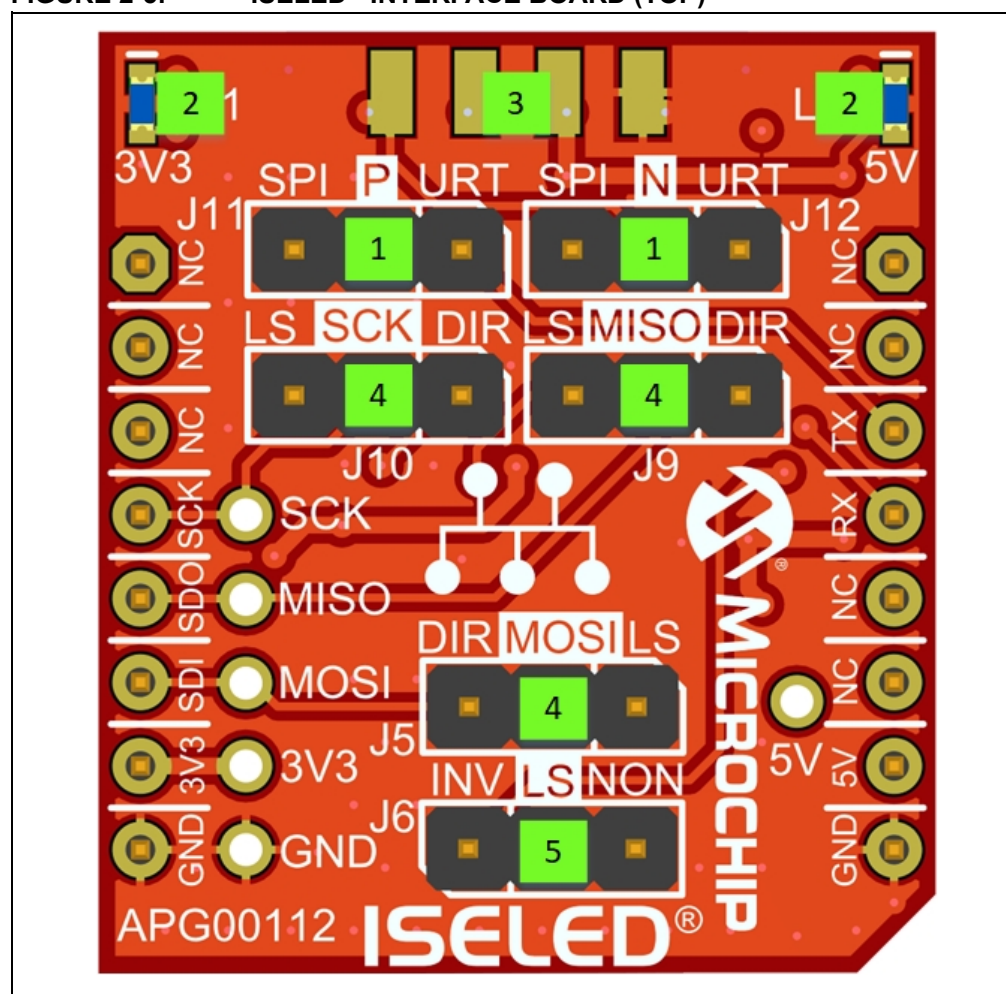
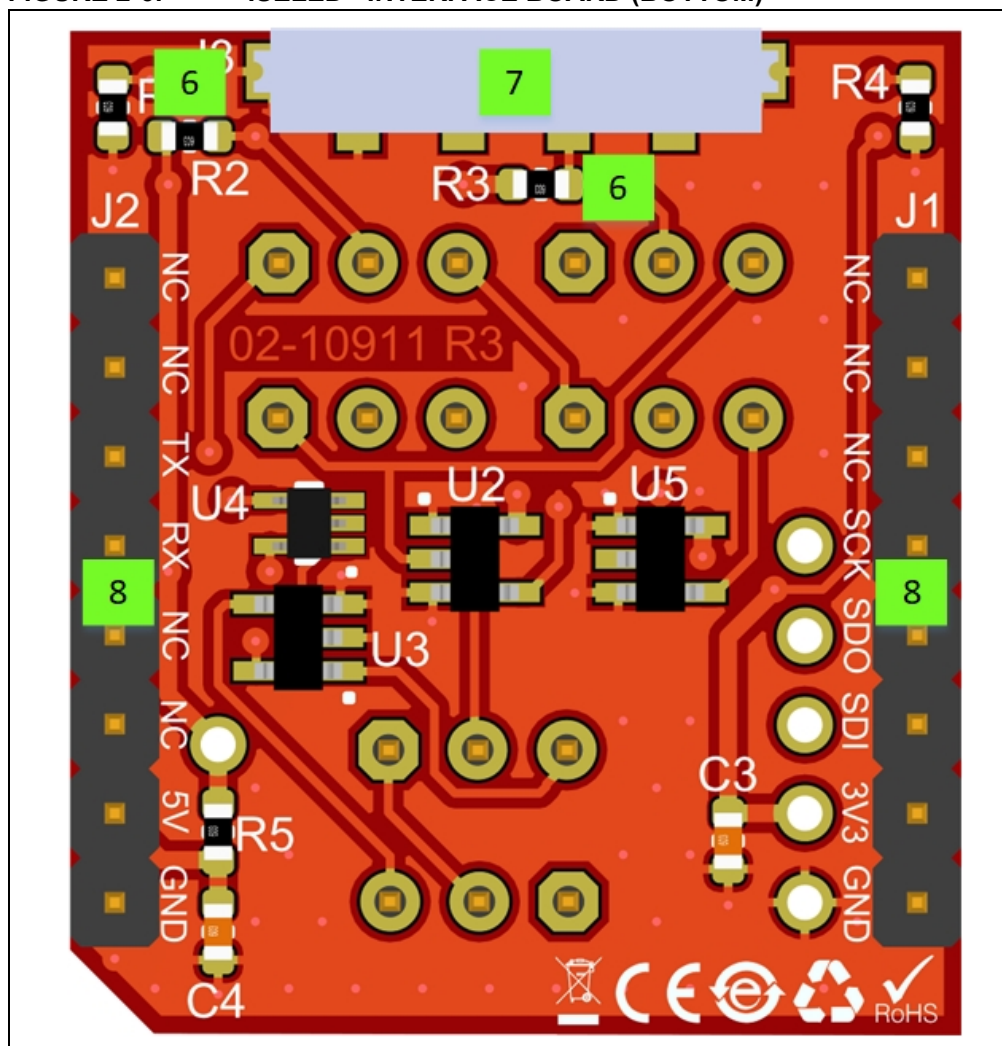
FIGURE 2-5: ISELED[®] INTERFACE BOARD (TOP)

FIGURE 2-6: ISELED® INTERFACE BOARD (BOTTOM)

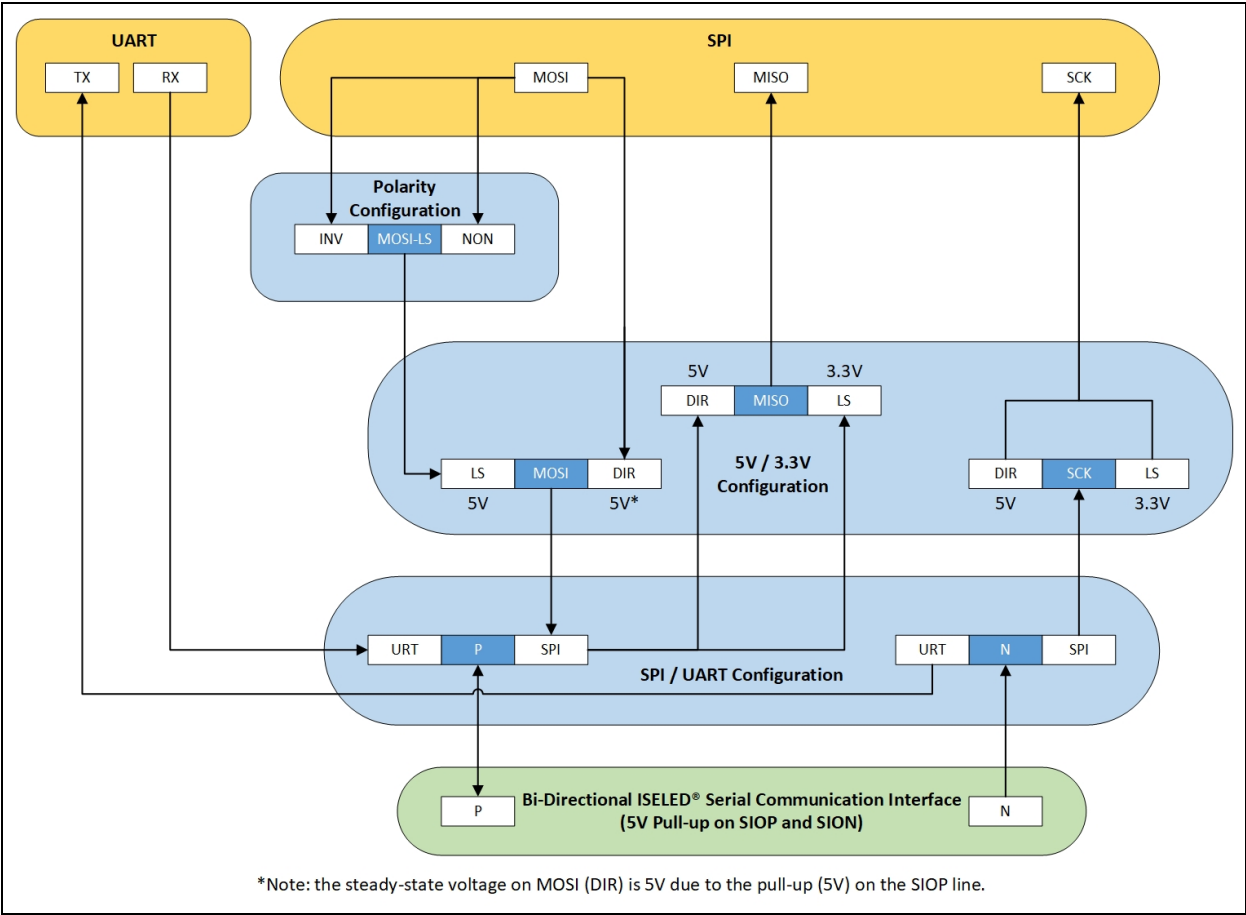


Note: Refer to the Appendix for additional details concerning the MikroElektronika mikroBUS Add-on Board standard.

TABLE 2-5: ISELED® INTERFACE BOARD KEY FEATURES

Number	Item	Description
1	SPI/UART configuration headers	Headers J11 and J12 determine the type of communication interface, SPI or UART, that will be used between the target MCU and the ISELED® devices. Note: Microchip has selected devices that allow either its SPI or UART to communicate with ISELED.
2	Power supply indicators	The ISELED Interface Board receives both 3.3V and 5V directly from the mikroBUS™ headers. Two LEDs, LD1 (5V) and LD2 (3.3V), indicate the status of these supplies. An illuminated LED indicates that the supply is active and present.
3	Alternate ISELED Development Board connections (socket)	<p>These connections mirror the connector pins of the ISELED connector (J3, bottom side) onto the top side of the board. They can be used to hardwire the ISELED Interface Board to the alternate ISELED Development Board connections. These pins are spaced 100mils (2.54mm) center to center and will require a solder connection between boards.</p> <p>Note: soldering boards together will greatly increase the mechanical stability between PCBs, especially when multiple ISELED Development Boards are daisy-chained together.</p>
4	Level-shifted/direct-connect configuration headers	The ISELED Development Platform is compatible with both 3.3V and 5V MCUs. Headers J9, J10 and J5 determine the voltage levels of the SPI/UART signals between the target MCU and the ISELED devices. Refer to Figure 2-7 and Table 2-1 for more details.
5	Non-inverted/inverted MOSI header	Header J6 determines the polarity of the MOSI signal between the target MCU and the ISELED Smart LEDs for MCUs with non-configurable open-drain I/O. This jumper setting is not required for MCUs like the PIC18F25K42 that have configuration open-drain I/O.
6	ISELED® master node pull-up resistors	Pull-up resistors, R2 and R3 (1k ohm), on the SION and SIOP lines for the ISELED master node. These resistors are also present and populated on the APG00113/APG00114 and are redundant if either of these boards is used with the ISELED Interface Board. The master pull-up resistors have been included on the ISELED Interface Board so that end users can connect their own ISELED boards to the ISELED Interface Board/Curiosity HPC development platform.
7	ISELED® Development Board connector	Socket style connector, J3. Primary connection between the ISELED Interface Board and the ISELED Development Board.
8	mikroBUS Add-on Board connectors	Headers J1 and J2. The ISELED Development Platform does not utilize all mikroBUS Add-on Board signals. Refer to Appendix for connection and usage details.

FIGURE 2-7: ISELED® CONFIGURATION HEADERS DIAGRAM



2.1.5 ISELED Development Board

The ISELED Development Board consists of 10 ISELED Smart LEDs (D1-D10) and an on-board 5V voltage regulator. The ISELED Development Board (see note below) is presented in the following two figures. The board includes the key features outlined in the diagrams below.

FIGURE 2-8: ISELED® DEVELOPMENT BOARD (TOP)

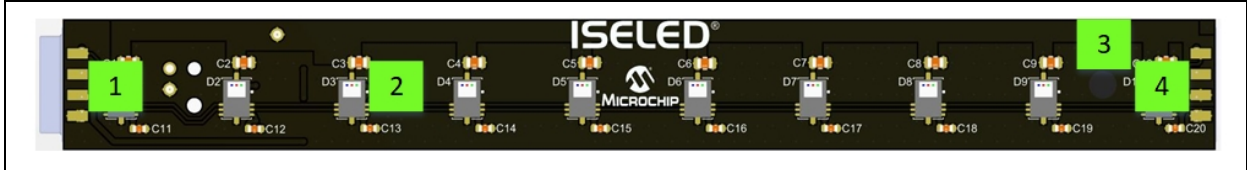
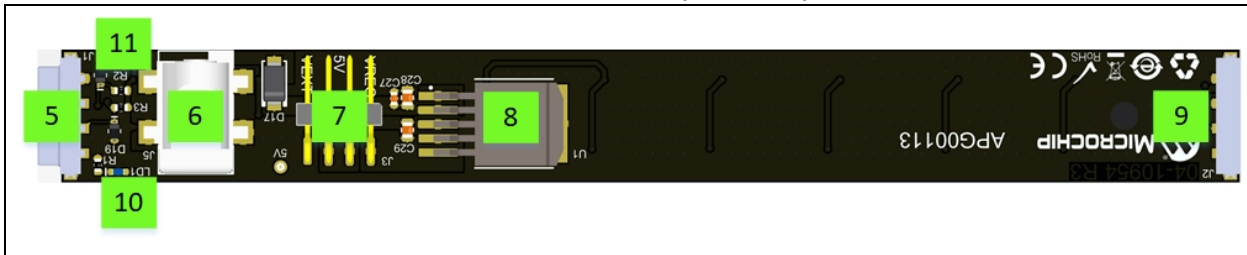


FIGURE 2-9: ISELED® DEVELOPMENT BOARD (BOTTOM)



Note: The Osram variant, APG00113, is pictured above (black soldermask). The Dominant variant, APG00114, is also available in white soldermask.

TABLE 2-6: ISELED® DEVELOPMENT BOARD KEY FEATURES

Number	Item	Description
1	Alternate ISELED® board connections (incoming)	These connections mirror the connector pins of the ISELED connector (J1, bottom side) onto the top side of the board. They can be used to directly wire the ISELED Development Board to the alternate ISELED Interface Board or the next development board connections in the series. These pins are spaced 100 mils (2.54 mm) center to center and will require a solder connection between boards.
2	ISELED Smart LED	Ten ISELED Smart LEDs (D1-D10) reside on the ISELED Development Board. Each Smart LED consists of one red, green and blue LED which form a “pixel”, which is then intelligently controlled by the ISELED smart RGB LED driver.
3	Standoff Hole	Hole for optional standoff to provide supplemental support to the ISELED Development Board. The hole will accommodate an M3 (#4) screw, 0.75" standoff.
4	Alternate ISELED board connections (outgoing)	These connections mirror the connector pins of the ISELED connector (J2, bottom side) onto the top side of the board. They can be used to directly wire the ISELED Development Board to the next alternate ISELED Development Board connections in the series. These pins are spaced 100 mils (2.54 mm) center to center and will require a solder connection between boards.
5	ISELED connector (plug)	Plug style connector, J1. Primary connection interface between the ISELED Development Board and ISELED Interface Board or next development board in the series.
6	External power jack	J5, max supply voltage 6-12V. Power jack connector - 2.5vmm inner diameter x 5.5mm outer diameter.

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TABLE 2-6: ISELED® DEVELOPMENT BOARD KEY FEATURES (CONTINUED)

Number	Item	Description
7	5V supply selector	Header, J3. Switches between the external 5V supply, VEXT_5V, which is sourced by the Curiosity HPC USB (or previous ISELED Development Board if not master ISELED) AND the on-board regulated 5V supply, VREG_5V, which is sourced by external DC power supply, VJACK.
8	On-board 5V regulator	MIC29501-5.0WU, 5V output, 5A max. Supply input from J5 (DC power jack).
9	ISELED connector (socket)	Plug style connector, J2. Primary connection interface between the one ISELED Development Board and the next ISELED Development Board in the series.
10	5V supply indicator LED	Supply indicator, LD1. Source - VEXT_5V or VREG_5V as determined by the state of the 5V Supply Selector, J3. An illuminated LED indicates that the 5V supply is active.
11	ISELED master pull-up resistors	The ISELED master pull-up resistors, R2 and R3, are populated on each development board. Remove R2 and R3 from all ISELED Development Boards in the series other than the master board (1st board in the chain).

2.1.5.1 5V SUPPLY SELECTOR

TABLE 2-7: ISELED® DEVELOPMENT BOARD SUPPLY OPTIONS

Power Input	Input	Max Current	Connector
External Board Power	5V USB from Curiosity HPC	500 mA	J1
	5V Regulated from previous ISELED® Development Board	5A	J1
DC Power Supply	7V MAX AC/DC converter or DC power supply	5A	J5

2.2 HARDWARE CONFIGURATION OPTIONS

The ISELED Development Platform is a highly configurable development tool. It can be used as a standalone ISELED demonstrator using pre-compiled firmware examples from Microchip or it can be configured specifically for user developed hardware and firmware.

2.2.1 Curiosity HPC Controller Board

1. Replace the PIC16F18875 on the Curiosity HPC with the PIC18F25K42 (target MCU).
2. Set the Curiosity HPC MCU supply jumper to the 5V position.
3. Program the target MCU with the desired firmware using MPLAB X IDE.
4. Attach the ISELED Interface Board to the mikroBUS socket #1.
5. Place the nylon screw through the standoff support hole on the ISELED Development Board and attach the 0.75" nylon standoff to the screw.
6. Connect the ISELED Development Board plug connector, J1, to the ISELED Interface Board socket connector, J3.
7. Configure the ISELED Interface Board jumpers.
 - Refer to [Section 1.3.1.1 “Default Jumper Settings”](#).
8. Configure the ISELED Development Board jumpers.
 - Refer to [Section 1.3.1.1 “Default Jumper Settings”](#).

2.2.2 ATSAMC21-XPRO Controller Board

1. Verify that the Power Supply jumper is installed.
2. Set the VCC MCU supply jumper to 5.0V.
3. Connect the ATSAMC21-XPRO USB connector to the PC.
4. Connect the ATBUSADAPTER-XPRO EXT connector to EXT1 on the ATSAMC21-XPRO.
5. Program the target MCU with the desired firmware using Atmel Studio 7.
6. Attach the ISELED Interface Board to the mikroBUS socket on the ATBUS-ADAPTER-XPRO.
7. Place the nylon screw through the standoff support hole on the ISELED Development Board and attach the 0.75" nylon standoff to the screw.
8. Connect the ISELED Development Board plug connector, J1, to the ISELED Interface Board socket connector, J3.
9. Configure the ISELED Interface Board jumpers.
 - Refer to [Section 1.3.2.1 “Default Jumper Settings”](#).
10. Configure the ISELED Development Board jumpers.
 - Refer to [Section 1.3.2.1 “Default Jumper Settings”](#).

2.2.3 dsPIC33C Curiosity Controller Board

1. Verify that the Power Supply jumper is installed.
2. Set the power supply jumper, J11, to +5V USB Power.
3. Connect the dsPIC33C Curiosity USB connector to the PC.
4. Program the dsPIC33CK256MP508 with the desired firmware using MPLAB X IDE.
5. Attach the ISELED Interface Board to the mikroBUS socket A.
6. Place the nylon screw through the standoff support hole on the ISELED Development Board and attach the 0.75" nylon standoff to the screw.

7. Connect the ISELED Development Board plug connector, J1, to the ISELED Interface Board socket connector, J3.
8. Configure the ISELED Interface Board jumpers.
 - Refer to [Section 1.3.3.1 “Default Jumper Settings”](#).
9. Configure the ISELED Development Board jumpers.
 - Refer to [Section 1.3.3.1 “Default Jumper Settings”](#).



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Chapter 3. Software

For details concerning software, please refer to www.microchip.com/iseled for updates or contact local sales.

Chapter 4. Troubleshooting Common Problems

4.1 ISELED SMART LEDS DO NOT ILLUMINATE

4.1.1 Target MCU Firmware

Ensure that the target MCU, PIC18F25K42, has been programmed with the correct firmware.

4.1.2 Jumper Settings

Check the ISELED Interface Board jumper placement and verify that the settings are correct for your configuration - SPI/UART, LS/DIR, etc.

4.1.3 mikroBUS Socket

Verify that the ISELED Interface Board is connected to mikroBUS socket labeled "1".

4.1.4 Power Supply

4.1.4.1 EXT CONNECTION

If the ISELED Development Board is to receive power from the Curiosity HPC (or previous ISELED Development Board), verify that a jumper has been placed onto J4 of the ISELED Interface Board AND the jumper setting on J3 of the ISELED Development Board is set to VEXT.

4.1.4.2 DC SUPPLY CONNECTION

If the ISELED Development Board is receive power from a DC power supply, verify that the DC supply is connected to J5 AND the jumper setting on J3 of the ISELED Development Board is set to VREG.

4.1.4.3 INSUFFICIENT POWER SUPPLY

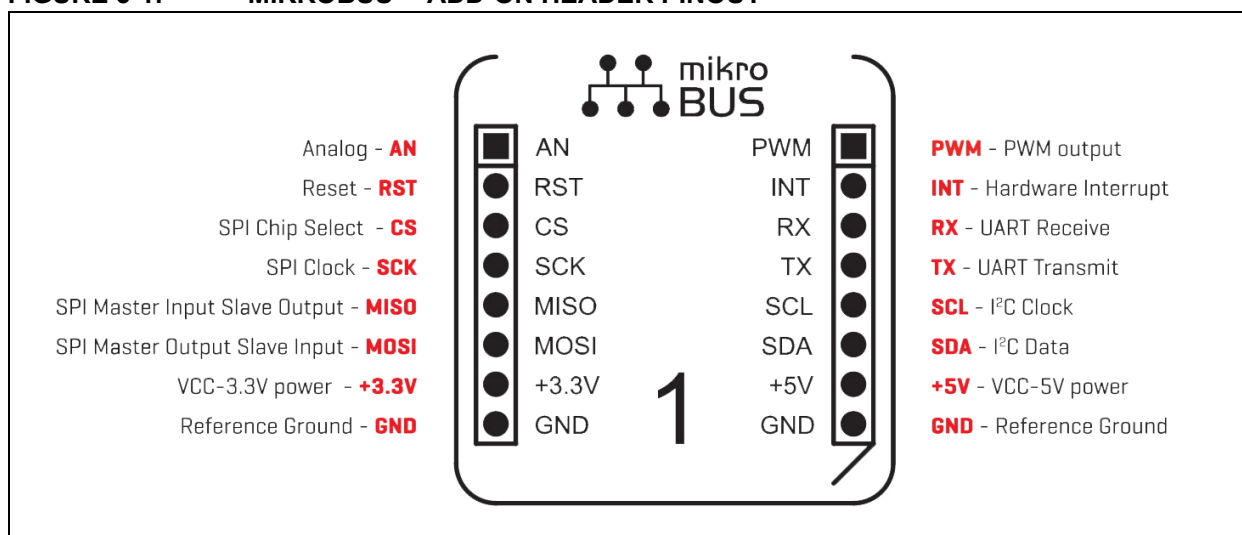
The selected supply cannot support the current load of the string of ISELED Smart LEDs. Increase the current capability of the power source OR power each ISELED Development Board separately. To do this, set the jumper across J3 to VREG on each ISELED Development Board. Attach DC power supplies to J5, the power jack.

Chapter 5. Appendix

5.1 mikroBUS ADD-ON HEADER

5.1.1 mikroBUS Add-On Header Pinout

FIGURE 5-1: MIKROBUS™ ADD-ON HEADER PINOUT



Additional details concerning the mikroBUS standard can be found at:
www.mikroe.com/mikrobus.

5.1.2 mikroBUS Add-On Board Pin Usage

The pin usage is summarized in the table below:

TABLE 5-1: ISELED® INTERFACE BOARD TO MIKROBUS™ CONNECTIONS

Header	
J1	J2
NC	NC
NC	NC
NC	RX
SCK	TX
MISO	NC
MOSI	NC
3V3	5V
GND	GND

5.2 SCHEMATICS

FIGURE 5-2: ISELED® INTERFACE BOARD SCHEMATIC

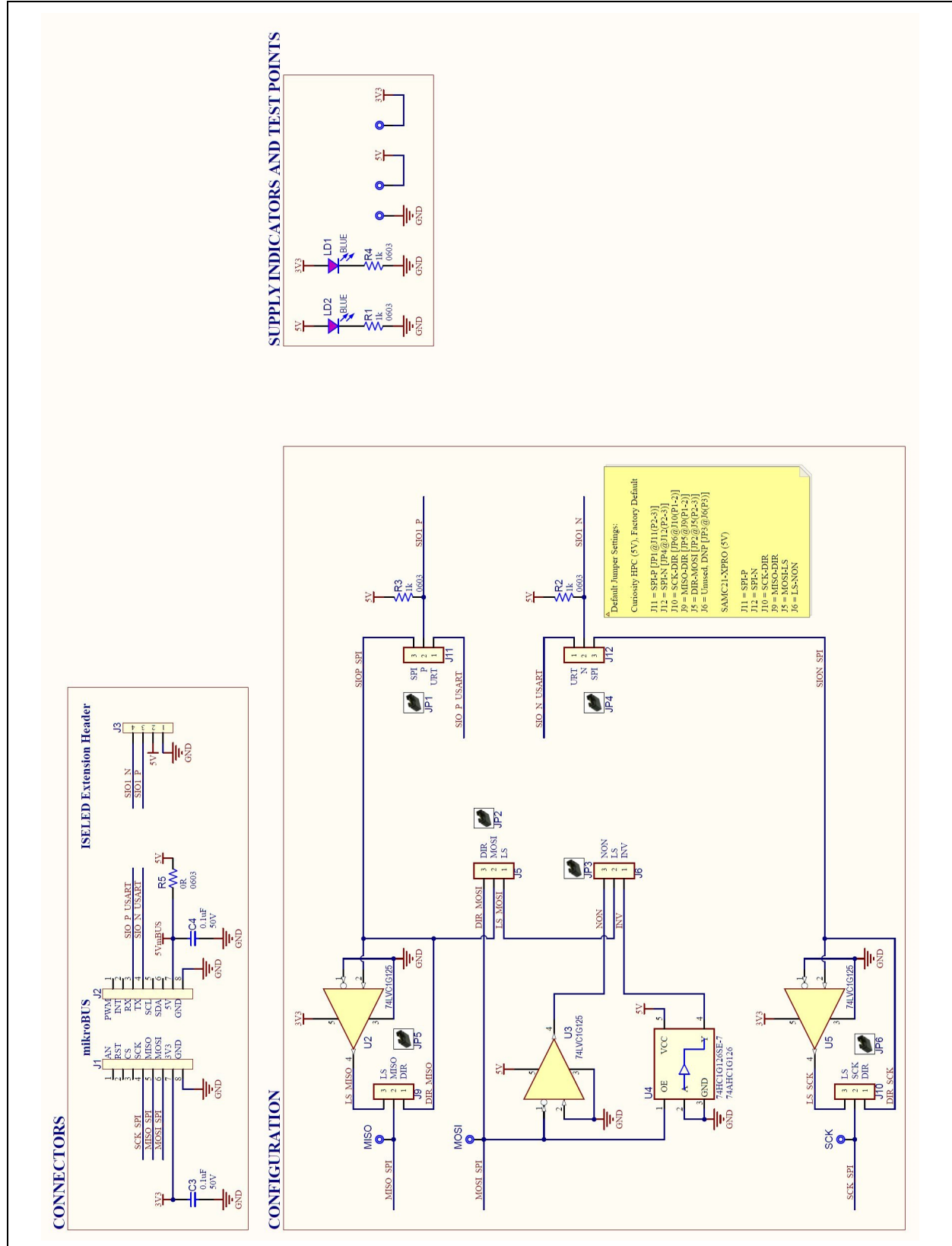
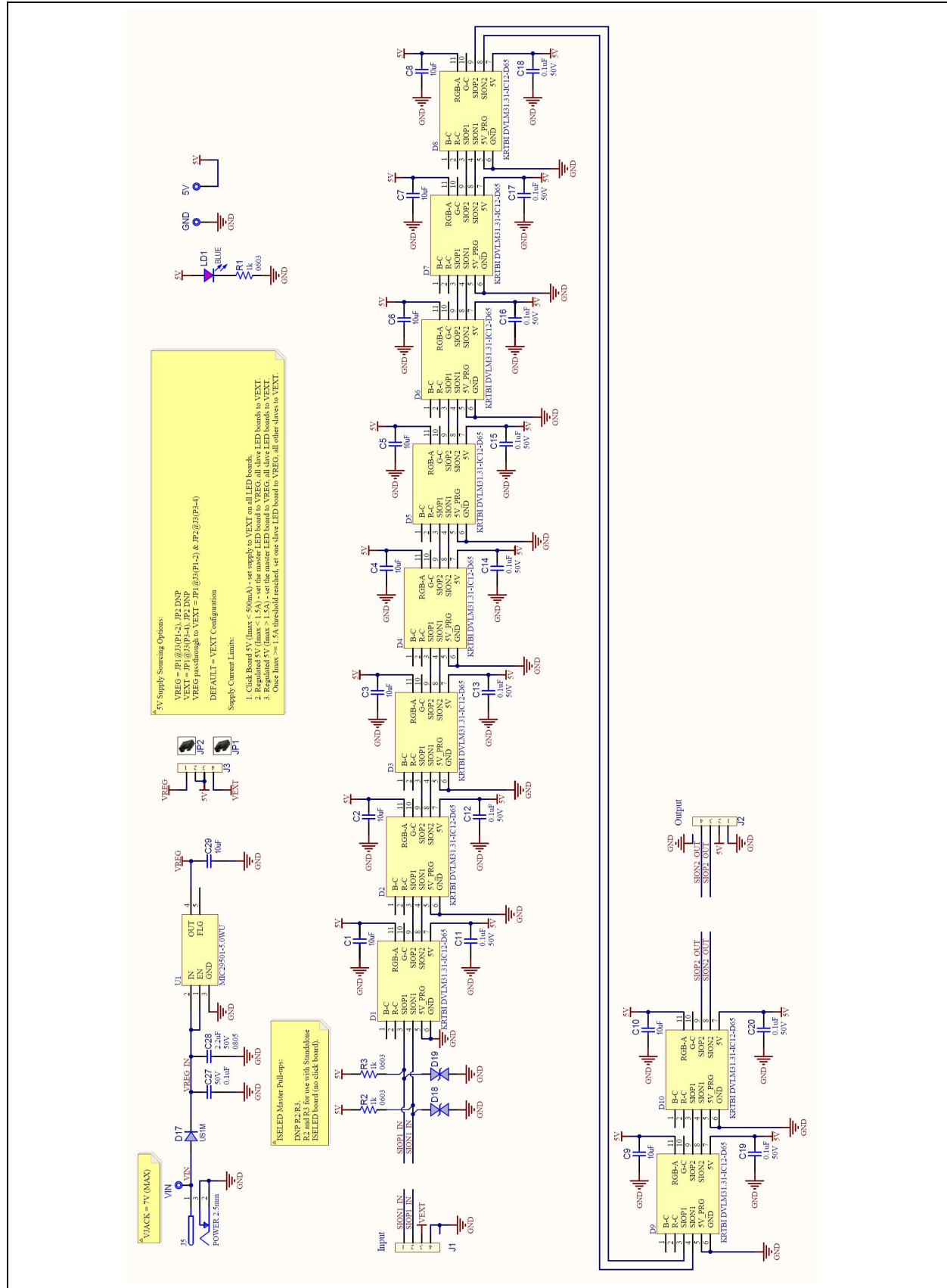


FIGURE 5-3: ISELED® DEVELOPMENT BOARD SCHEMATIC



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