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CY8CKIT-005

MiniProg4 Program and Debug Kit Guide

Doc. # 002-19782 Rev. *B

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Safety Information



The CY8CKIT-005 MiniProg4 Program and Debug Kit is intended for use as a development platform for hardware or software in a laboratory environment. In a domestic environment, this product may cause radio interference. In such cases, you may be required to take adequate preventive measures. In addition, this board should not be used near any medical equipment or RF devices.

Attaching additional wiring to this product or modifying the product operation from the factory default may affect its performance and cause interference with other apparatus in the immediate vicinity. If such interference is detected, suitable mitigating measures should be taken.

The CY8CKIT-005 MiniProg4 Program and Debug Kit, as shipped from the factory, has been verified to meet with the requirements of CE as a Class A product.



The CY8CKIT-005 MiniProg4 Program and Debug Kits are sensitive to electrostatic discharge (ESD). Electrostatic charges accumulate on the human body and on other equipment. Devices that are subjected to high-energy discharges can suffer permanent damage. Proper ESD precautions are recommended to prevent loss of functionality. Store unused CY8CKIT-005 MiniProg4 Program and Debug Kits in the protective shipping package.



End-of-Life/Product Recycling

The end-of life for this kit is five years from the date of manufacture mentioned as bar code on the back of the box. Contact your nearest recycler for discarding the kit.

General Safety Instructions

ESD Protection

ESD can damage boards and associated components. Cypress recommends that you work on the board at an ESD workstation, if available. Otherwise, use appropriate ESD protection, such as an antistatic wrist strap attached to a ground, when handling parts.

1 Introduction



The MiniProg4 Program and Debug Kit is an all-in-one programmer and debugger for PSoC 4, PSoC 5LP, and PSoC 6 MCU devices. MiniProg4 also provides USB-I²C, USB-SPI and USB-UART bridging functionality. The MiniProg4 provides a special feature enabling users to write their own custom firmware through the custom application mode.

Figure 1-1. MiniProg4



1.1 Kit Contents

The CY8CKIT-005 PSoC[®] MiniProg4 Program and Debug Kit includes:

- MiniProg4 programmer/debugger
- 10-pin ribbon cable
- USB Type-A to Type-C Cable
- Quick Start Guide

1.2 Programming and Debugging

The MiniProg4 programmer/debugger provides the flexibility to work with SWD programming and debugging interfaces. MiniProg4 supports 32-bit Arm[®] Cortex[®]-M0/M0+/M3/M4 PSoC devices.

The MiniProg4 debugger is supported by the software tools [PSoC Creator](#), [ModusToolbox™](#), [Cypress Programmer](#), and [PSoC Programmer](#).

1.3 Bridging

MiniProg4 supports USB-I²C, USB-UART and USB-SPI as standard bridging protocols for any device. The MiniProg4 bridging capabilities are used by PSoC Creator, ModusToolbox, Cypress Programmer, PSoC Programmer, Bridge Control Panel, and other applications. Tuning software tools such as the CapSense Tuner provided by Cypress also use these capabilities.

1.4 Documentation Conventions

Table 1-1. Document Conventions for User Guides

Convention	Usage
Courier New	Displays file locations, user-entered text, and source code: C:\...cd\icc\
<i>Italics</i>	Displays file names and reference documentation: Read about the <i>sourcefile.hex</i> file in the <i>PSoC Designer User Guide</i> .
[Bracketed, Bold]	Displays keyboard commands in procedures: [Enter] or [Ctrl] [C]
File > Open	Represents menu paths: File > Open > New Project
Bold	Displays commands, menu paths, and icon names in procedures: Click the File menu, and then click Open .
Times New Roman	Displays an equation: $2 + 2 = 4$
Text in gray boxes	Describes cautions or unique functionality of the product.

2. Installing MiniProg4



This chapter shows how to install MiniProg4 and its associated PC software.

2.1 MiniProg4

Figure 2-1. Top View

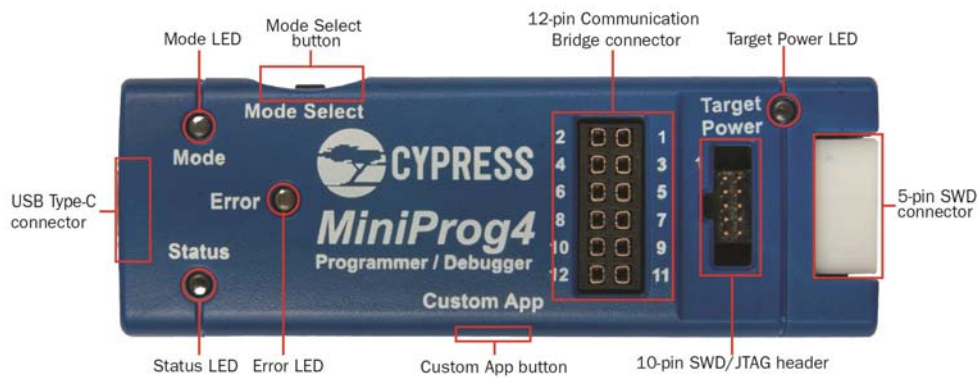


Figure 2-2. Bottom View



2.2 MiniProg4 Installation

The MiniProg4 programmer/debugger is supported by PSoC Programmer, ModusToolbox, Cypress Programmer, and PSoC Creator. Other software, such as Bridge Control Panel, use the PSoC Programmer COM layer to support MiniProg4 functionality.

Note: PSoC Programmer is compatible only with the Windows Operating System however, Cypress Programmer is compatible with Windows, macOS, and Linux. To understand the differences between PSoC Programmer and Cypress Programmer, please see the Cypress Programming Solutions page at <http://www.cypress.com/products/psoc-programming-solutions>.

1. Download and install [PSoC Programmer](#) or [Cypress Programmer](#). Follow the on-screen instructions to install the software.

Each programming tool supports a subset of Cypress devices. See respective tool documentation for which device each supports.

2. Launch PSoC Programmer or Cypress Programmer and connect the MiniProg4 to your computer's USB port using the provided USB cable. When properly connected, and drivers have been installed, the Mode LED either turns ON or will be ramping (slowly increasing and decreasing brightness) depending on the mode.

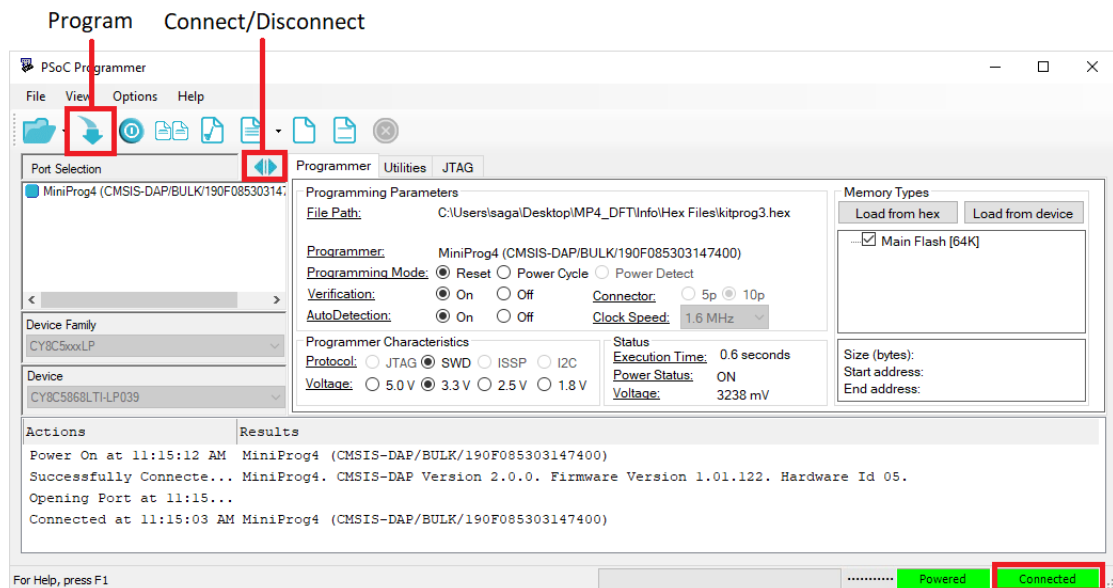
Note that the MiniProg4 drivers are automatically installed.

3. In PSoC Programmer, to connect to the port, in the Port Selection pane, click the MiniProg4 device. You can also click **Connect/Disconnect** button as shown in [Figure 2-3](#).

If the connection is successful, a status indicator in the lower-right corner of the PSoC Programmer window turns green and shows "Connected".

You can now use MiniProg4 to program the target device by clicking the **Program** button.

Figure 2-3. PSoC Programmer: MiniProg4 Connect/Disconnect and Program



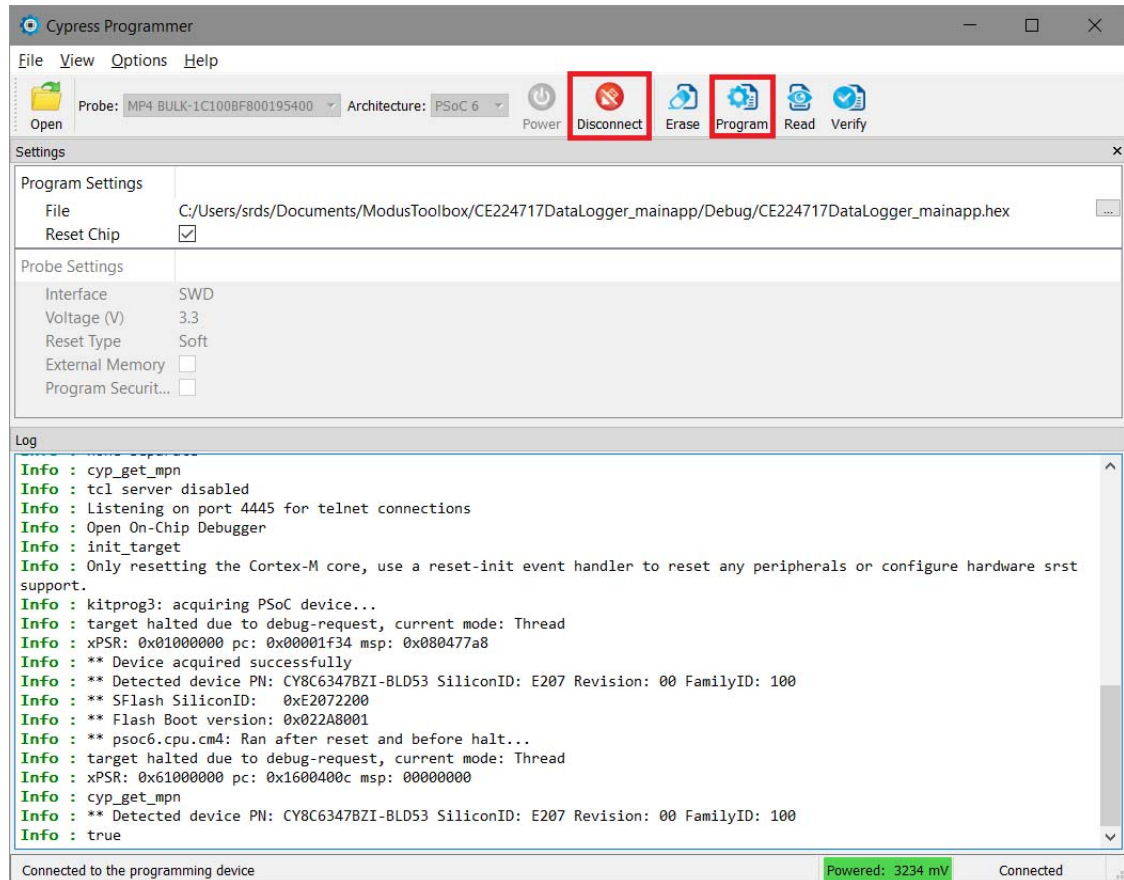
For more information on how to use PSoC Programmer, see **Help Topics** under the **Help** menu in PSoC Programmer or press **[F1]**.

In Cypress Programmer, to connect to the MiniProg4 probe, click **Connect/Disconnect** button as shown in [Figure 2-4](#).

If the connection is successful, a status indicator in the lower-right corner of the Cypress Programmer window turns green and shows “Connected”.

You can now use MiniProg4 to program the target device by clicking the **Program** button.

Figure 2-4. Cypress Programmer: MiniProg4 Connect/Disconnect and Program



For more information on how to use Cypress Programmer, see **View Help** under the **Help** menu in Cypress Programmer or press **[F1]**.

2.3 MiniProg4 LEDs

MiniProg4 has three indicator LEDs - Mode (Amber), Status (Green), and Error (Red) as shown in Figure 2-5. Table 2-1 indicates the behavior of these LEDs for various operations.

Figure 2-5. MiniProg4 LEDs



Table 2-1. LED representation for various operations of MiniProg4

Programming Mode	Programming Status	Three LEDs		
		Mode Indicator (Amber LED)	Status Indicator 1 (Green LED)	Status Indicator 2 (Red LED)
CMSIS-DAP HID	Programming	Ramping (1 Hz)	8 Hz	OFF
	Success		ON	OFF
	Error		OFF	ON
	Idle		OFF	OFF
CMSIS-DAP Bulk	Programming	ON	8 Hz	OFF
	Success		ON	OFF
	Error		OFF	ON
	Idle		OFF	OFF
Bootloader	N/A	1 Hz	OFF	OFF
Custom Application	N/A	8 Hz	ON	ON

2.4 MiniProg4 Buttons

MiniProg4 has two buttons that enable switching between various operating modes. [Figure 2-6](#) shows the location of the buttons. In order to understand switching MiniProg4 modes, refer to [Figure 2-7](#).

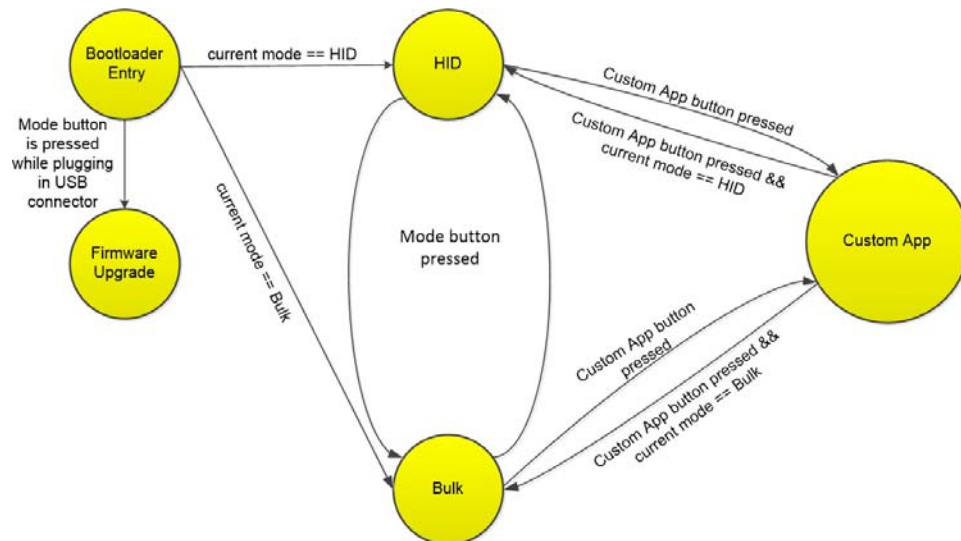
On power-up, MiniProg4 is in CMSIS-DAP/BULK Mode by default. If the Mode Select button is pressed, MiniProg4 enters CMSIS-DAP/HID mode. If the Custom App button is pressed, MiniProg4 enters custom application mode where a user can run their own custom applications on the MCU contained in the MiniProg4. See [Figure 2-7](#) for details.

For details of LED indications of various modes of MiniProg4, refer to [Table 2-1](#).

Figure 2-6. MiniProg4 Buttons



Figure 2-7. Various MiniProg4 Button Modes



3. Technical Description



MiniProg4 is a protocol translation device. With MiniProg4, the PC host software can communicate through a USB port to the target device to be programmed or debugged, as shown in [Figure 3-1](#). [Table 3-1](#) lists the protocols that are supported by each connector. MiniProg4 enables communication with the target devices using I/O voltage levels from 1.5 V to 5 V.

Figure 3-1. System Block Diagram

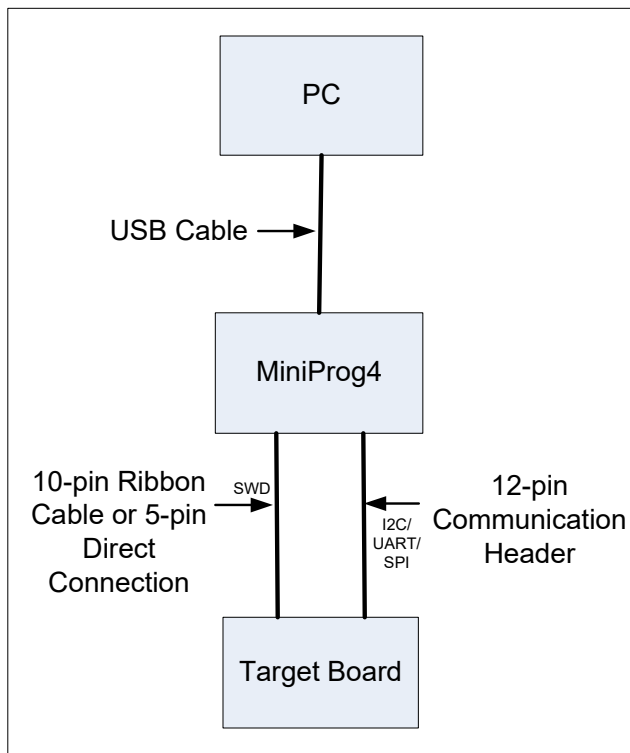


Table 3-1. Connectors / Communication Protocol Support

Connector	SWD	i ² C	SPI	UART (With and Without Flow Control)
5-pin	Supported	N/A	N/A	N/A
10-pin	Supported	N/A	N/A	N/A
6x2 header	N/A	Supported	Supported	Supported

3.1 Interfaces

3.1.1 SWD

ARM-based devices support the Serial Wire Debug (SWD) protocol. The PSoC 4, PSoC 5LP, and PSoC 6 MCU device families implement this standard, which offers programming and debugging functions. MiniProg4 supports programming and debugging of PSoC 4, PSoC 5LP, and PSoC 6 devices using SWD through the 5-pin or 10-pin connector.

Before programming a PSoC 4, PSoC 5LP, or PSoC 6 MCU device, make sure you review the electrical connection requirements in the respective device datasheet or in the PSoC 4, PSoC 5LP, and PSoC 6 MCU device programming specifications. You can find the datasheets and programming specifications here:

www.cypress.com/PSoC4
www.cypress.com/PSoC5LP
www.cypress.com/PSoC6

3.1.2 I²C

I²C is a common serial interface standard. It is mainly used for communication between microcontrollers and other ICs on the same board but can also be used for intersystem communications. MiniProg4 uses an I²C multimaster host controller that allows the tool to exchange data with I²C-enabled devices on the target board. For example, this feature may be used to tune CapSense[®] designs.

MiniProg4 serves as a USB-I²C bridge (acts as I²C Master) that can be used to communicate with a I²C slave devices through the Bridge Control Panel software. For I²C connections use the 6x2 connector. MiniProg4 has internal pull-up resistors and supports I²C speed up to 1 MHz.

3.1.3 SPI

The Serial Peripheral Interface (SPI) is a synchronous serial communication interface specification used for short distance communication, primarily in embedded systems. SPI devices communicate in full duplex mode using a master-slave architecture with a single master.

MiniProg4 serves as a USB-SPI bridge (acts as SPI Master) that can be used to communicate with a SPI slave devices through the Bridge Control Panel software. For SPI connections use the 6x2 connector. MiniProg4 supports SPI speed up to 6 MHz.

3.1.4 UART with and without Flow Control

UART is another common serial interface standard. MiniProg4 supports UART, which allows the tool to receive data from UART enabled devices on the target board. MiniProg4 provides UART communication both with and without hardware flow control. In order to enable flow control, RTS and CTS pins are provided in the 6x2 I/O header. If flow control is not required, CTS and RTS pins can be left floating. Terminal emulators such as Tera Term or PuTTY can be used to communicate with the target PSoC device. MiniProg4 supports UART speed up to 115200 Baud Rate.

3.1.5 Reference

For more information on the PSoC 4, PSoC 5LP, and PSoC 6 MCU's JTAG, SWD, and I²C interfaces, see the [PSoC 4, PSoC 5LP, and PSoC 6 Technical Reference Manuals](#).

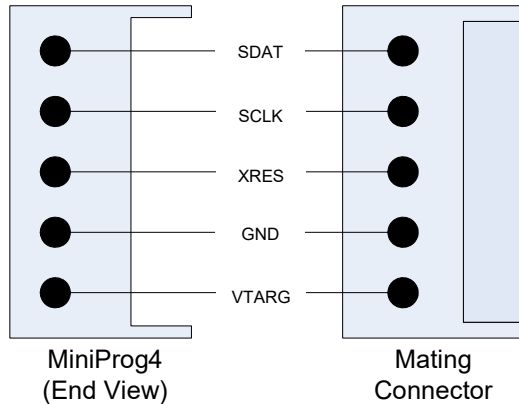
For more details on how to use MiniProg4 with Bridge Control Panel, refer to the Bridge Control Panel Help document.

3.2 Connectors

3.2.1 5-Pin Connector

The 5-pin connector is configured as a single row with a 100-mil pitch. Suggested mating connector part number is Molex Connector Corporation 22-23-2051.

Figure 3-2. 5-Pin Connector with Pin Assignments

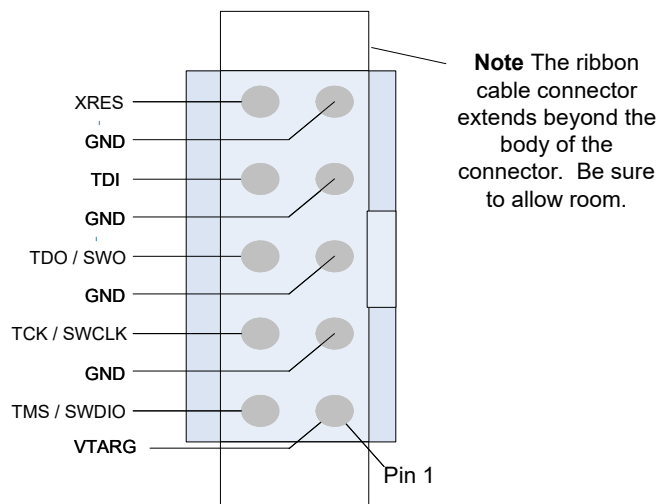


Note: If the design requires MiniProg4 to be directly plugged to the target board with a 5-pin header, adequate mechanical clearance shall be provided near the 5-pin header on the target board. The width & height of MiniProg4 (5-pin header area) is 25mm x 13mm. If the design cannot meet the required mechanical clearance, use a stackable header (such as Proto-PIC 20690).

3.2.2 10-Pin Connector

The 10-pin connector is configured as a dual row with 50-mil pitch. It is used with a ribbon cable (provided) to mate to a similar connector on the target board. The signal assignment is shown in [Figure 3-3](#). Suggested mating connector part number is CNC Tech 3220-10-0300-00 or Samtec Inc. FTSH-105-01-F-DV-K-TR.

Figure 3-3. 10-Pin Connector with Pin Assignments



Here is a summary of the protocols and related pin assignments. The pin mapping is also shown on the back of the MiniProg4 case.

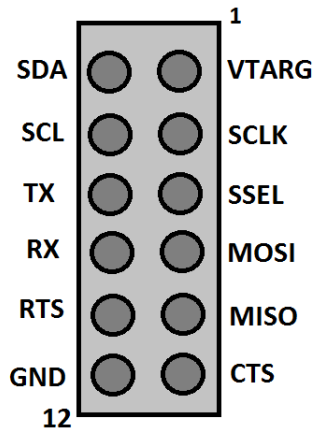
Table 3-2. Communication Protocol Pin Assignments

Protocol	Signal	5-Pin	10-Pin
SWD	SDIO	5	2
	SCK	4	4
	XRES	3	10

3.2.3 6x2 Connector

This connector supports all the communication protocols like I²C, SPI, UART (with or without flow control supported by MiniProg4). [Figure 3-4](#) shows the pin assignments. They are also shown on the back of the MiniProg4 case.

Figure 3-4. 6x2 Connector Pin Assignments



3.3 Power

MiniProg4 can be powered using the USB interface.

On kits/boards where there is a single power supply for the entire board, MiniProg4 can supply power to the board. However, this supply is limited to approximately 200 mA, and is protected against excess current draw. You can select 1.8 V, 2.5 V, 3.3 V, or 5 V from PSoC Programmer or Cypress Programmer. The 5 V supply may vary between 4.25 V–5.5 V, because it is supplied directly from the USB port. The maximum deviation for other voltages is $\pm 5\%$.

Note: Some PSoC device families do not support 5 V operation. Refer to the respective device datasheet for supported voltage selection.



Voltage stress beyond acceptable limits can permanently damage MiniProg4. Programming signals can withstand over-voltage up to maximum 12 V and minimum up to -5 V. Communication bridge signals (I2C, UART & SPI) can withstand over-voltage only up to maximum 6 V and minimum up to -1 V.

A. Appendix



A.1 Regulatory Compliance Information

The CY8KCIT-005 MiniProg4 Program and Debug Kit complies with the CE-Low Voltage Directive 2006/95/EC (Europe) safety requirement. It has been tested and verified to comply with the following electromagnetic compatibility (EMC) regulations.

- CISPR 22 - Emissions
- EN 55022 Class A - Immunity (Europe)
- CE - EMC Directive 2004/108/EC
- CE Declaration of Conformity

Revision History



Document Revision History

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Document Number: 002-19782				
Revision	ECN#	Issue Date	Origin of Change	Description of Change
**	6284494	10/31/2018	NMIT	New kit guide.
*A	6378762	11/08/2018	SRDS	Updated Installing MiniProg4 chapter on page 7: Updated "MiniProg4 Installation" on page 8: Updated description. Updated Figure 2-3 .
*B	6581024	05/24/2019	SRDS	Updated Copyright information.