KIT_PSC3M8_CC1 PSOC™ Control C3M8 Digital Power Control Card user guide

About this document

Scope and purpose

This document describes the features and hardware details of the PSOC™ Control C3M8 Digital Power Control Card. It is designed to provide an evaluation platform for digital control applications with the PSOC™ Arm® Cortex® -M33 based MCU. This board is part of Infineon's digital power evaluation platform kits.

Intended audience

This document is intended for KIT_PSC3M8_CC1 users, and this board is intended to be used under laboratory conditions.

Downloaded from Arrow.com.

Important notice

“Evaluation Boards and Reference Boards” shall mean products embedded on a printed circuit board (PCB) for demonstration and/or evaluation purposes, which include, without limitation, demonstration, reference and evaluation boards, kits and design (collectively referred to as “Reference Board”).

Environmental conditions have been considered in the design of the Evaluation Boards and Reference Boards provided by Infineon Technologies. The design of the Evaluation Boards and Reference Boards has been tested by Infineon Technologies only as described in this document. The design is not qualified in terms of safety requirements, manufacturing and operation over the entire operating temperature range or lifetime.

The Evaluation Boards and Reference Boards provided by Infineon Technologies are subject to functional testing only under typical load conditions. Evaluation Boards and Reference Boards are not subject to the same procedures as regular products regarding returned material analysis (RMA), process change notification (PCN) and product discontinuation (PD).

Evaluation Boards and Reference Boards are not commercialized products, and are solely intended for evaluation and testing purposes. In particular, they shall not be used for reliability testing or production. The Evaluation Boards and Reference Boards may therefore not comply with CE or similar standards (including but not limited to the EMC Directive 2004/EC/108 and the EMC Act) and may not fulfill other requirements of the country in which they are operated by the customer. The customer shall ensure that all Evaluation Boards and Reference Boards will be handled in a way which is compliant with the relevant requirements and standards of the country in which they are operated.

The Evaluation Boards and Reference Boards as well as the information provided in this document are addressed only to qualified and skilled technical staff, for laboratory usage, and shall be used and managed according to the terms and conditions set forth in this document and in other related documentation supplied with the respective Evaluation Board or Reference Board.

It is the responsibility of the customer’s technical departments to evaluate the suitability of the Evaluation Boards and Reference Boards for the intended application, and to evaluate the completeness and correctness of the information provided in this document with respect to such application.

The customer is obliged to ensure that the use of the Evaluation Boards and Reference Boards does not cause any harm to persons or third party property.

The Evaluation Boards and Reference Boards and any information in this document is provided "as is" and Infineon Technologies disclaims any warranties, express or implied, including but not limited to warranties of non-infringement of third party rights and implied warranties of fitness for any purpose, or for merchantability.

Infineon Technologies shall not be responsible for any damages resulting from the use of the Evaluation Boards and Reference Boards and/or from any information provided in this document. The customer is obliged to defend, indemnify and hold Infineon Technologies harmless from and against any claims or damages arising out of or resulting from any use thereof.

Infineon Technologies reserves the right to modify this document and/or any information provided herein at any time without further notice.

Downloaded from Arrow.com.

Safety precautions

Safety precautions

***Note**: Please note the following warnings regarding the hazards associated with development systems.*

Table 1 Safety precautions

	**Warning:** *The DC link potential of this board is up to 1000 V or more. When measuring voltage waveforms by oscilloscope, high voltage differential probes must be used. Failure to do so may result in personal injury or death.*
	**Warning:** *The evaluation or reference board contains DC bus capacitors which take time to discharge after removal of the main supply. Before working on the drive system, wait five minutes for capacitors to discharge to safe voltage levels. Failure to do so may result in personal injury or death. Darkened display LEDs are not an indication that capacitors have discharged to safe voltage levels.*
	**Warning:** *The evaluation or reference board is connected to the grid input during testing. Hence, high-voltage differential probes must be used when measuring voltage waveforms by oscilloscope. Failure to do so may result in personal injury or death. Darkened display LEDs are not an indication that capacitors have discharged to safe voltage levels.*
	**Warning:** *Remove or disconnect power from the drive before you disconnect or reconnect wires, or perform maintenance work. Wait five minutes after removing power to discharge the bus capacitors. Do not attempt to service the drive until the bus capacitors have discharged to zero. Failure to do so may result in personal injury or death.*
	**Caution:** *The heat sink and device surfaces of the evaluation or reference board may become hot during testing. Hence, necessary precautions are required while handling the board. Failure to comply may cause injury.*
	**Caution:** *Only personnel familiar with the drive, power electronics and associated machinery should plan, install, commission and subsequently service the system. Failure to comply may result in personal injury and/or equipment damage.*
	**Caution:** *The evaluation or reference board contains parts and assemblies sensitive to electrostatic discharge (ESD). Electrostatic control precautions are required when installing, testing, servicing or repairing the assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with electrostatic control procedures, refer to the applicable ESD protection handbooks and guidelines.*
	**Caution:** *A drive that is incorrectly applied or installed can lead to component damage or reduction in product lifetime. Wiring or application errors such as undersizing the motor, supplying an incorrect or inadequate AC supply, or excessive ambient temperatures may result in system malfunction.*
	**Caution:** *The evaluation or reference board is shipped with packing materials that need to be removed prior to installation. Failure to remove all packing materials that are unnecessary for system installation may result in overheating or abnormal operating conditions.*

Downloaded from Arrow.com.

Table of contents

About this document . . . 1
Important notice . . . 2
Safety precautions . . . 3
Table of contents . . . 4
1 Introduction . . . 5
1.1 Kit contents . . . 5
1.2 Getting started . . . 5
1.3 Key features . . . 5
2 Kit operation . . . 7
2.1 Using the Out of the box example . . . 8
2.2 Creating a project and program/debug using ModusToolbox™ software . . . 10
3 Hardware . . . 15
3.1 Hardware functional description . . . 15
3.1.1 PSOC™ Control C3M8 Digital Power Control Card . . . 15
3.1.2 PSOC™ Control C3M8 MCU . . . 16
3.1.3 PSOC™ Control C3M8 MCU power supply system . . . 16
3.1.4 PSOC™ Control C3M8 MCU I/Os . . . 19
3.1.5 120-pin Edge finger interface . . . 20
3.1.6 Analog-to-digital converter (ADC) input filter . . . 21
3.1.7 Reset button . . . 22
3.1.8 LEDs . . . 22
3.1.9 Digital isolators . . . 23
3.1.10 CAN FD header . . . 23
3.1.11 PMBUS header . . . 24
3.1.12 PSOC™ C3M8 Interface Board . . . 25
3.1.13 PSOC™ Control C3M8 MCU clock architecture . . . 25
3.1.14 PSOC™ Control C3M8 MCU external program/debug headers . . . 26
3.1.15 XMC4200 as onboard programmer/debugger . . . 27
3.1.16 Removing the onboard debugger . . . 28
4 Production data . . . 29
Revision history . . . 30
Trademarks . . . 31
Disclaimer . . . 32

Downloaded from Arrow.com.

1 Introduction

1.1 Kit contents

The following are the kit contents:

- PSOC™ Control C3M8 Digital Power Control Card
- PSOC™ Control C3M8 interface Board
- USB Type-A to Type-C cable
- Quick start guide (printed on the kit package)

1.2 Getting started

The following sections will help you get familiar with this evaluation kit:

- The Kit operation section describes the major features of the PSOC™ Control C3M8 Digital Power Control Card and functionalities such as programming, debugging, USB-UART, and I2C
- The Hardware section provides a detailed hardware description
- Application development using the PSOC™ Control C3M8 Digital Power Control Card is supported in ModusToolbox™ software. ModusToolbox™ software is a free development ecosystem that includes the Eclipse IDE for ModusToolbox™ software and the PSOC™ Control C3M8 SDK with the PSOC™ Control C3M8 MCU. Using ModusToolbox™ software, you can enable and configure device resources, middleware libraries, write C/assembly source code, program, and debug the device. You can download the software from the ModusToolbox™ home page. See the ModusToolbox™ software installation guide for additional information
- There are a wide range of code examples to evaluate the PSOC™ Control C3M8 Digital Power Control Card. These examples help you familiarize with the PSOC™ Control C3M8 MCU and create your own design. These examples can be accessed through the ModusToolbox™ Project Creator tool. Alternatively, you can also visit Infineon's code examples for the ModusToolbox™ software page to access these examples

1.3 Key features

The PSOC™ Control C3M8 Digital Power Control Card is equipped with the following features:

- Infineon PSOC™ Control C3M8 (Arm® Cortex® -M33 based) MCU PSC3M8GFS3PAHQ1, 180 MHz, up to 512 KB flash/64+64 KB SRAM, programmable power control accelerator, E-LQFP-100
- Connection to evaluation boards like the Dual Buck Evaluation Board via the 120-pin Edge connector, including analog signals and PWM
- Three LED's
  - STATUS LED – User-controlled LED
  - DEBUG LED and COM LED – Debugger controlled LEDs
- Isolated debug options (default)
  - On-Board Debugger (SEGGER J-Link LITE) via USB connector
  - Isolation needs to be built between this connector and the computer side to avoid overvoltage in the computer
- Isolated connectivity
  - UART channel of the On-Board Debugger (SEGGER J-Link LITE) via USB connector
- Two non-isolated debug options (default no load)
  - SWD/JTAG via a 10-pin 1.27 mm header
  - SWD/UART via an 8-pin 2.54 mm header

Downloaded from Arrow.com.

- Communication Interfaces
  - Isolated CAN FD
  - Non isolated PMBUS
- Power supply of PSOC™ Control C3M8
  - Via evaluation board (5 V typical, 16 V max) converted to 3.3 V
  - Via debug USB connector, 5 V DC-DC isolater, and converted to 3.3 V
- Power supply of XMC4200 MCU isolated debug domain
  - Via debug USB connector

Downloaded from Arrow.com.

2 Kit operation

The PSOC™ Control C3M8 Digital Power Control Card is an evaluation board designed to help engineers in learning and testing the digital power control applications. The board features a PSOC™ Control C3M8 MCU based on an Arm® Cortex® -M33 core. The dimensions of the board (53 mm in height and 72 mm in width to the connector) allow the use of this evaluation card in designs with high requirements on power density. The control card integrates an isolated on-board debugger for a plug-and-play experience. The isolated debugger part can be detached once the code is finalized. In particular, the dimensions of the PSOC™ Control C3M8 Digital Power Control Card after the isolated debugger is detached (30 mm in height and 72 mm in width to the connector) are suitable for 1U rack designs. The following figures provide a detailed description of the hardware and its usage.

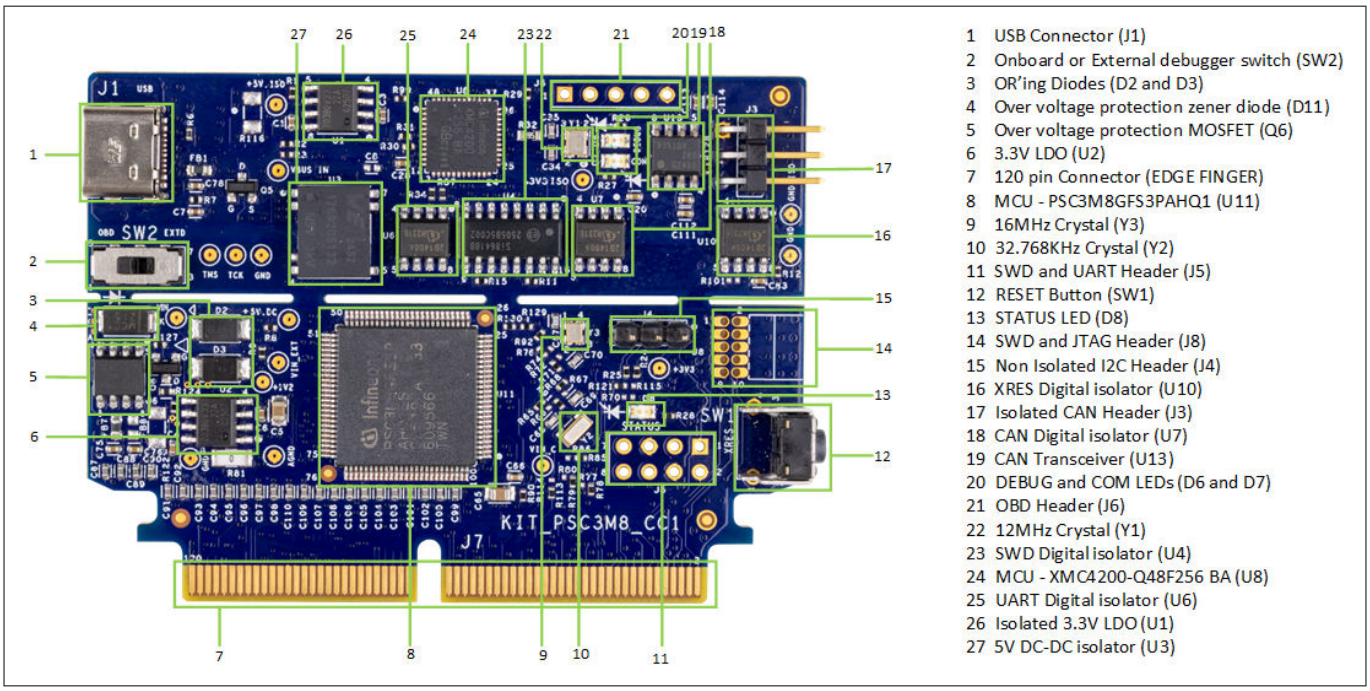


Figure 1 PSOC™ Control C3M8 Digital Power Control Card hardware description (1)

Downloaded from Arrow.com.

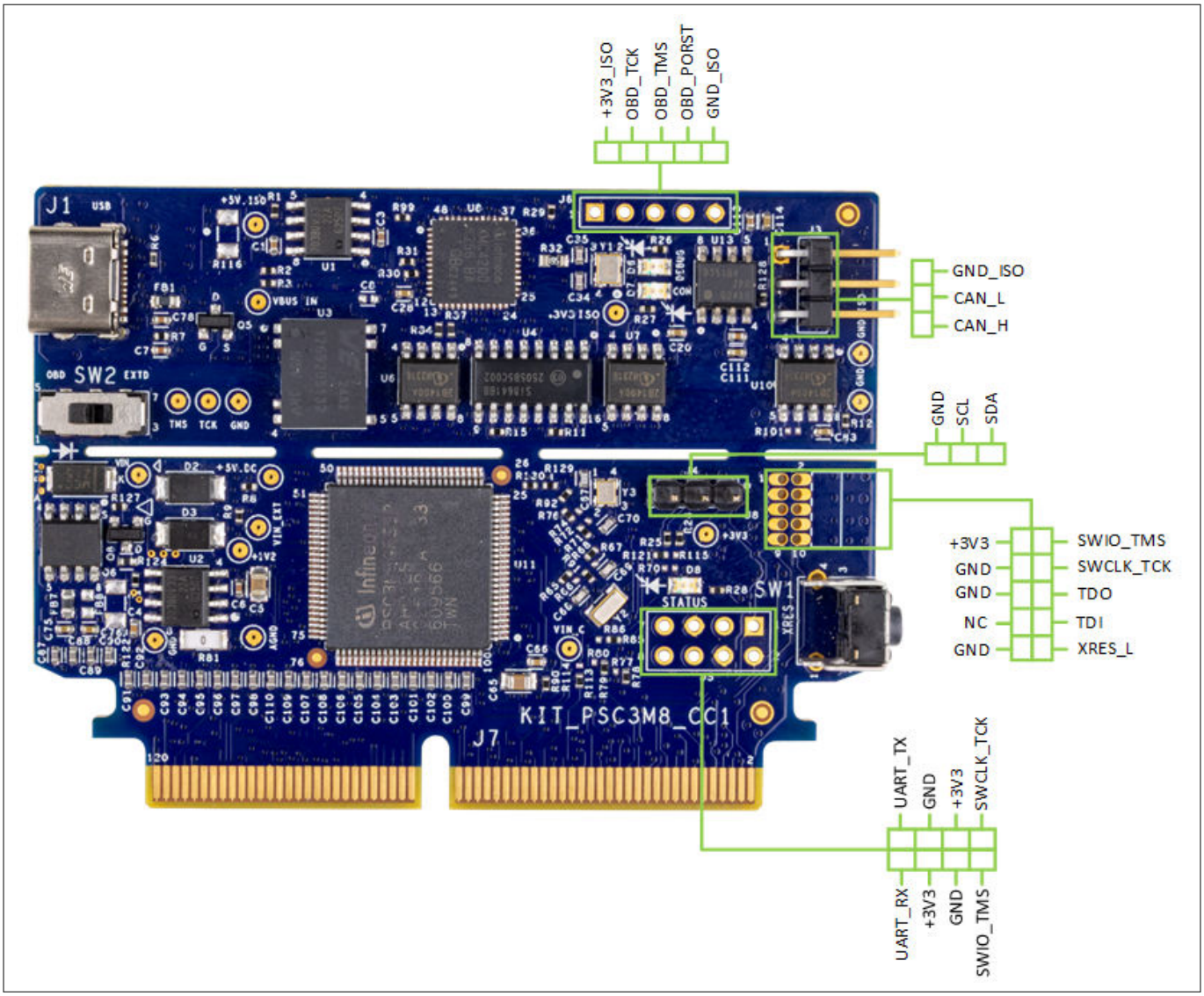


Figure 2 PSOC™ Control C3M8 Digital Power Control Card hardware description (2)

2.1 Using the Out of the box example

The PSOC™ Control C3M8 Digital Power Control Card coming with the interface board is by default programmed with the code example, PSOC™ Control MCU: OOB code. For a detailed description of the project, refer to the example's `README.md` file in the GitHub repository. The `README.md` file is also available in the application directory once the application is created using ModusToolbox™.

Downloaded from Arrow.com.

***Note**: At any point in time, if you overwrite the default application, you can restore it by programming the PSOC™ Control MCU: OOB code.*

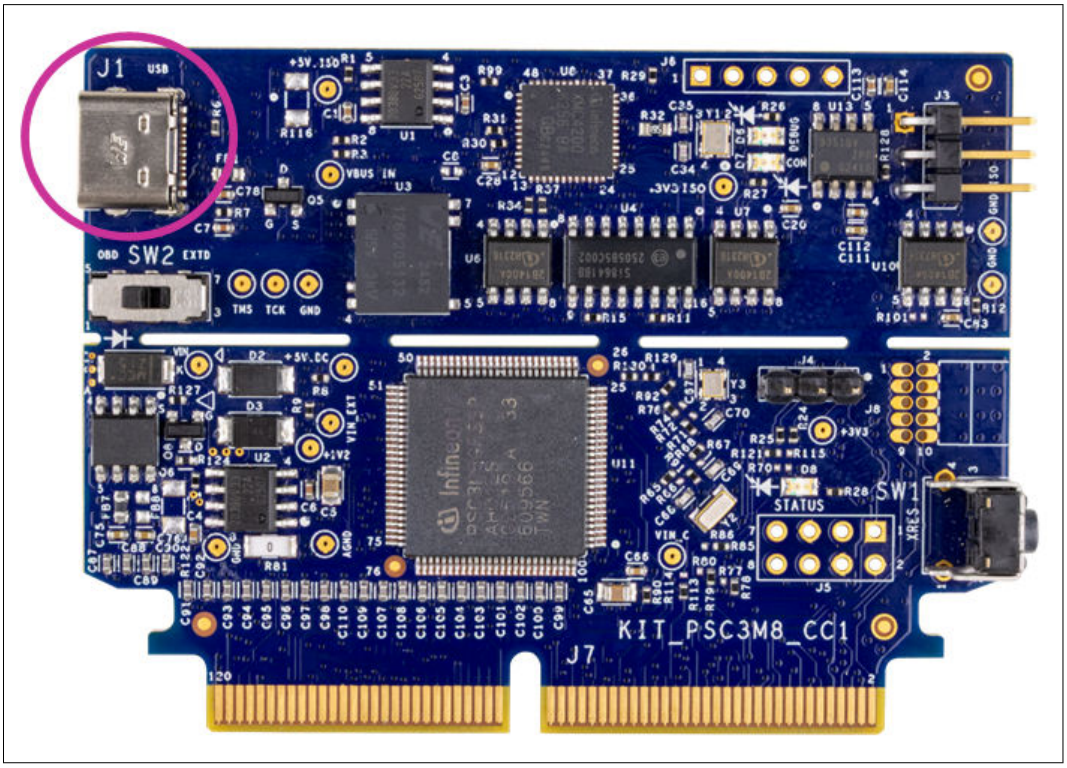


Figure 3 Connect USB cable to USB connector on the board

The following steps describe how to use the code example:

1. Ensure that the PSOC™ Control C3M8 Digital Power Control Card is mounted on the interface board using the 120-pin Edge connector
2. Connect the kit to your PC using the provided USB cable through the J-Link USB connector J1
3. Open a terminal program and select the COM port. Set the serial port parameters to 8N1 and 115200 baud
4. Verify that the COM LED on the PSOC™ Control C3M8 Digital Power Control Card is glowing
5. Press the XRES button (SW1) on the board and confirm that the serial terminal application displays the boot-up message, as shown in Figure 4
6. Confirm that the user LED (D8) blinks
7. Follow the instructions on the boot-up message

Downloaded from Arrow.com.

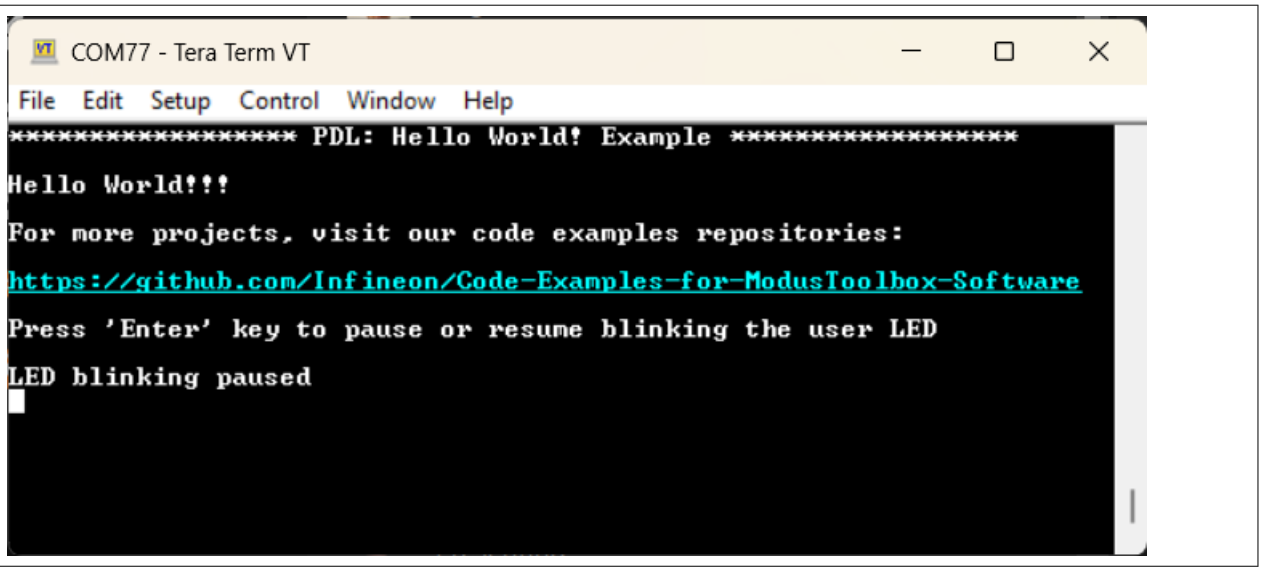


Figure 4 Serial terminal boot message

2.2 Creating a project and program/debug using ModusToolbox™ software

The PSOC™ Control C3M8 Digital Power Control Card can be programmed and debugged using the onboard JLink debugger. This onboard programmer/debugger supports USB-UART Bridge functionality. An XMC4200 device is used to implement the JLink functionality. For more details on the JLink, see the J-Link debug probes.

The following steps briefly introduce project creation, programming, and debugging using ModusToolbox™ software. For detailed instructions, see **Help** > **ModusToolbox™** > **General Documentation** > **ModusToolbox™ User Guide** .

***Note**: The programming can be done either with the onboard JLink debugger or by attaching an external debugger to the connector J8 on the board. The user can easily switch between the onboard debugger or external debugger by setting the switch SW2 to the desired position. It is recommended to use the onboard JLink debugger.*

1. Connect the board to the PC using the provided USB cable through the JLink USB connector, as shown in Figure 3. It enumerates as a USB composite device if you are connecting it to your PC for the first time
2. The debugger on this kit is with JLink and one UART. The COM LED (green) is always ON if the USB is connected
3. In the Eclipse IDE for ModusToolbox™ software, import the desired code example (application) into a new workspace:
   a. Select **Quick Panel** > **New Application** > **Start** section

Downloaded from Arrow.com.

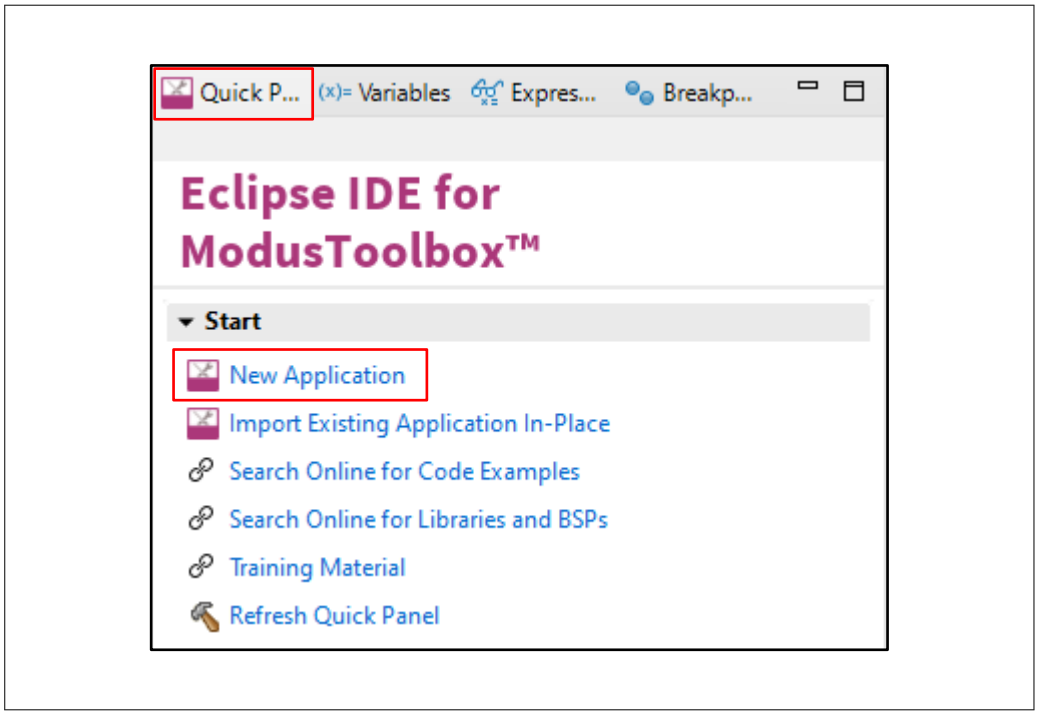


Figure 5 Create new application

b. Select **BSP -KIT_PSC3M8_CC1** from **Choose Board Support Package** window then click **Next**

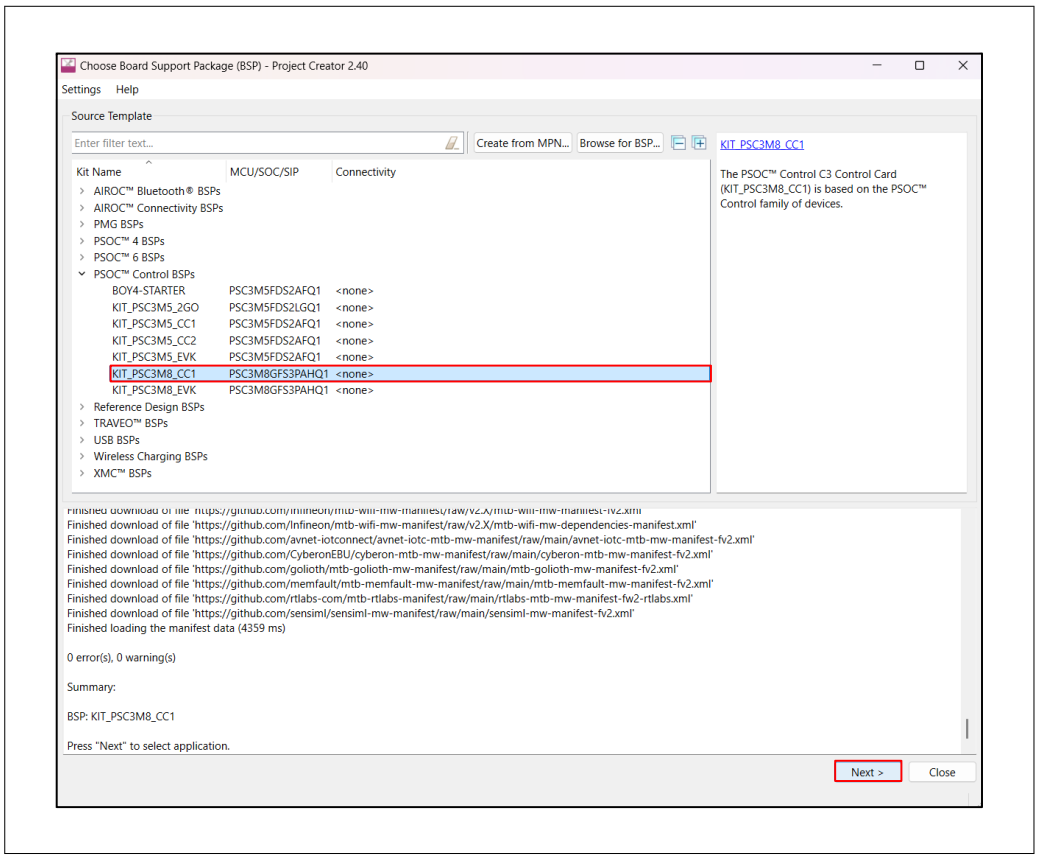


Figure 6 Creating a new application: Choose Board Support Package

c. Select the application from **Select Application** window then click **Create**

Downloaded from Arrow.com.

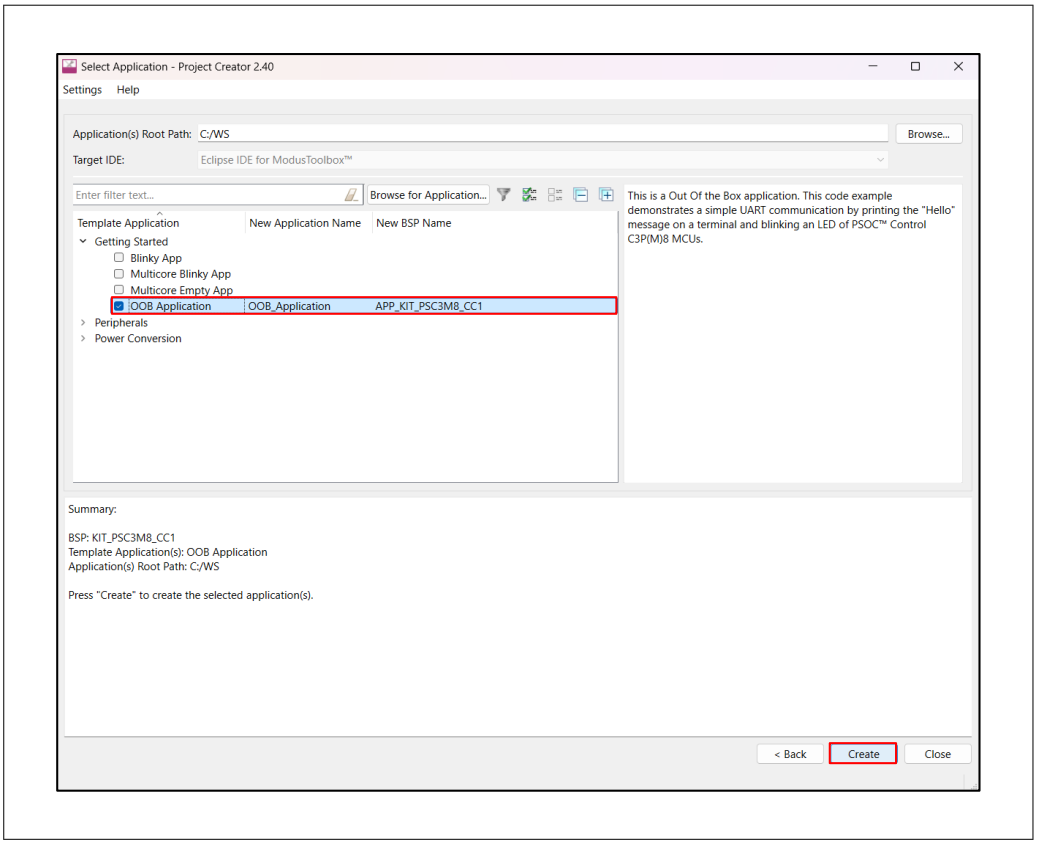


Figure 7 Creating a new application: Select Application

4. To build and program a PSOC™ Control C3M8 MCU application:

a. Select **Project Explorer**, then select **<App_Name>** project

b. From **Quick Panel**, click **<App_Name> the Program (JLink)** configuration from **Launches** section, as shown in Figure 8. ModusToolbox™ software has an integrated debugger also.

Downloaded from Arrow.com.

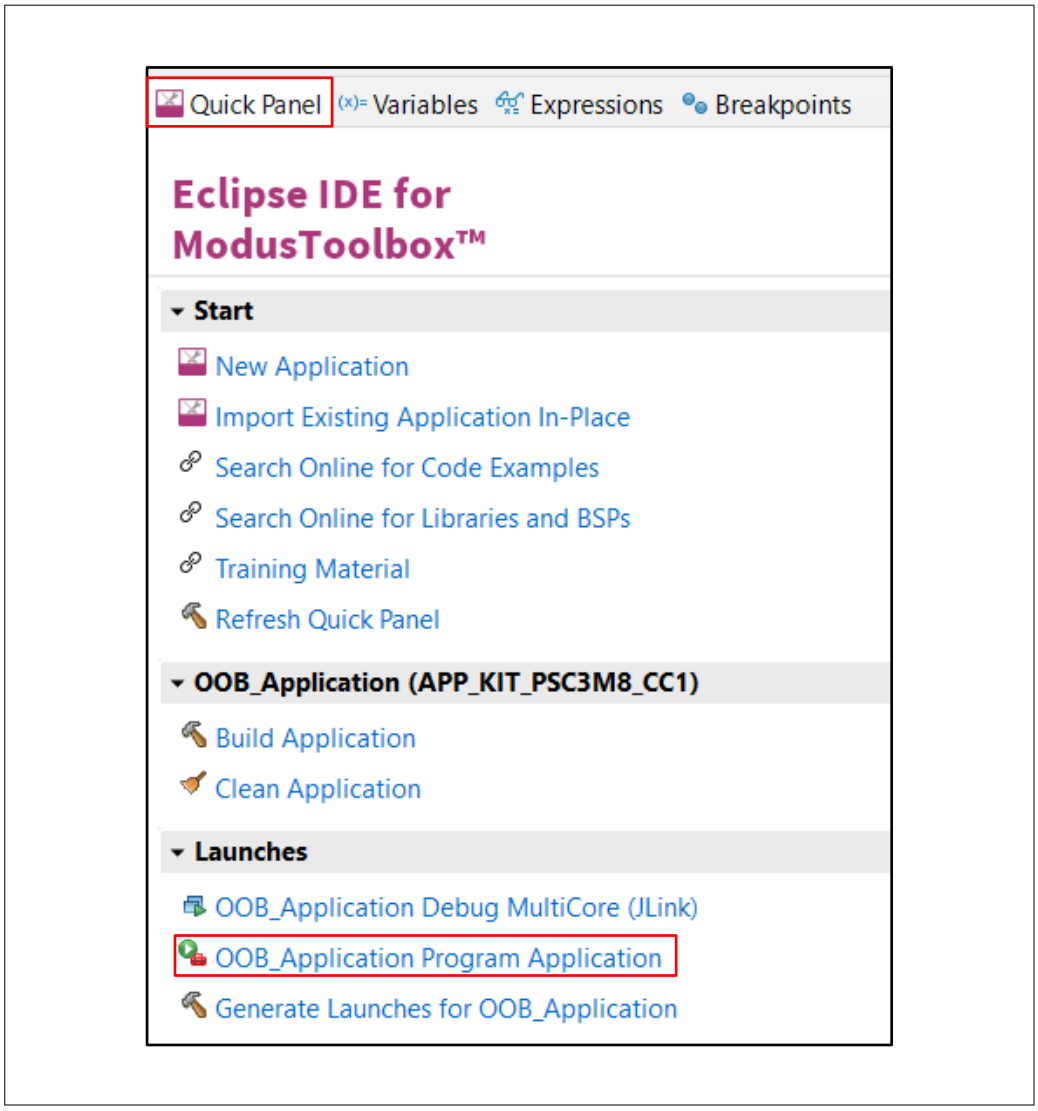


Figure 8 Programming in ModusToolbox™ software

5. To debug a PSOC™ Control C3M8 MCU application:

a. From **Project Explorer**, select **<App_Name>** project

b. From **Quick Panel**, Select **<App_Name>** > **Debug (JLink)** configuration from the Launches section, as shown in Figure 9 For more details, see the Program and debug section in the Eclipse IDE for ModusToolbox™ user guide

Downloaded from Arrow.com.

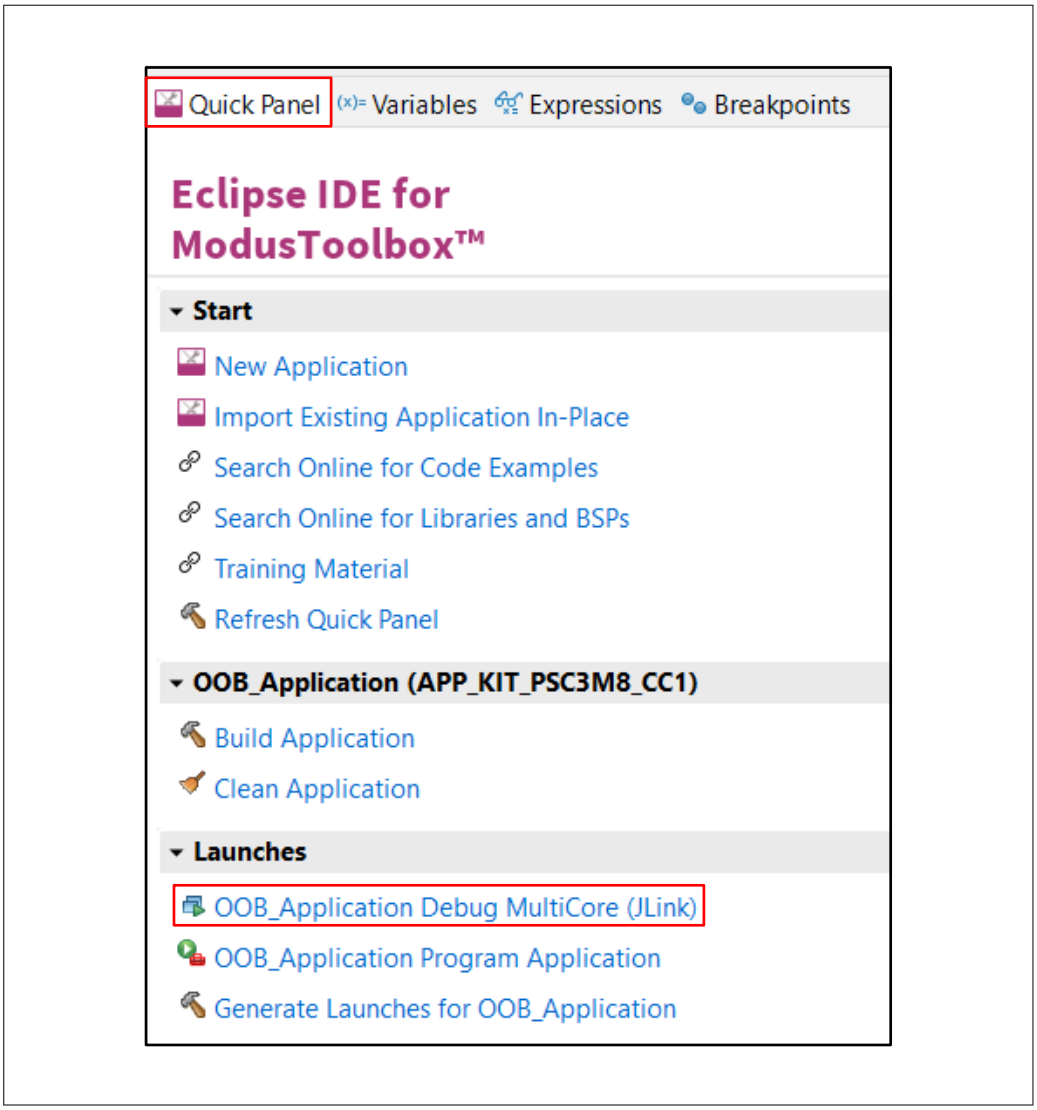


Figure 9 Debugging in ModusToolbox™ software

Downloaded from Arrow.com.

3 Hardware

3.1 Hardware functional description

This section explains the individual hardware blocks.

3.1.1 PSOC™ Control C3M8 Digital Power Control Card

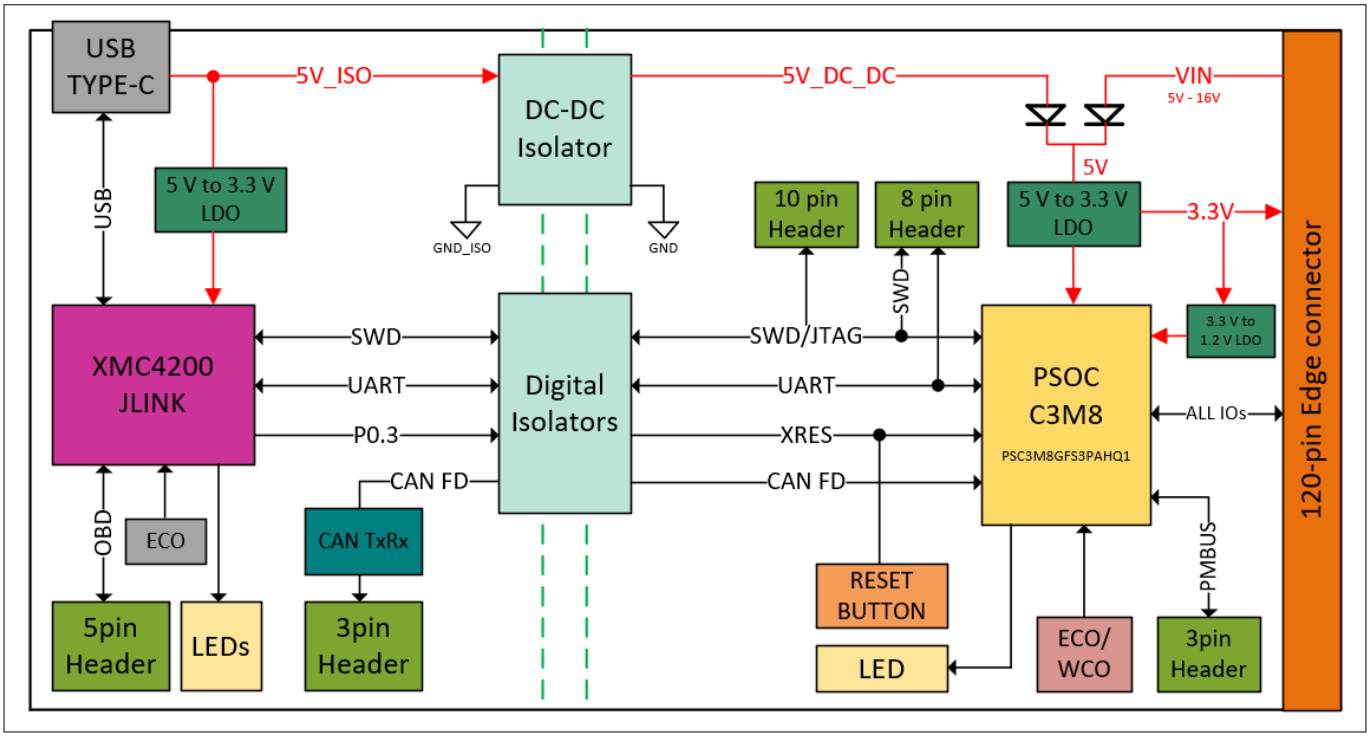


Figure 10 Block diagram PSOC™ Control C3M8 Digital Power Control Card

The control card is designed for the PSOC™ C3M8 MCU in an 100-pin LQFP package. There is an onboard isolated JLink debugger implemented with the XMC4200 MCU. All the IOs from the PSOC™ C3M8 MCU are routed out on a 120-pin Edge finger that can be inserted into a mating connector (MPN: HSEC8-160-01-L-DV-A-BL) on evaluation boards.

Downloaded from Arrow.com.

3.1.2 PSOC™ Control C3M8 MCU

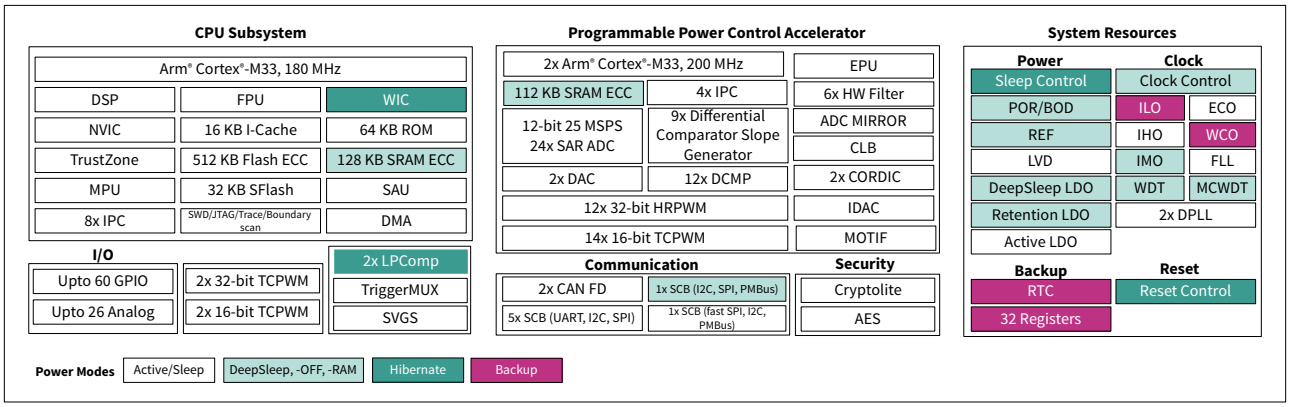


Figure 11 Block diagram PSOC™ Control C3M8 MCU

The PSC3(P/M)(8/7)x - devices are based on the Arm® Cortex®-M33 running up to 180 MHz with DSP and FPU capability. Additionally, the devices contain programmable power control accelerator (PPCA) peripherals, with two Arm® Cortex®-M33 running at up to 200 MHz, 12-bit 25 MSPS ADCs, comparators, hardware filters, custom logic block, differential comparator slope generator, DAC, and advanced timers with high-resolution capability for high performance real time closed loop control systems.

3.1.3 PSOC™ Control C3M8 MCU power supply system

The PSOC™ C3M8 MCU operates using a regulated VDDD supply within the range of 1.7 V to 3.6 V and a VREF of 1.2 V. In addition, there is an optional VBACKUP supply that can be used, which has a range of 1.4 V to 3.6 V. A linear regulator powers the core logic at four voltage levels: 0.9 V, 1.0 V, 1.1 V, and 1.2 V. Voltage level switching is implemented by writing to the power control registers. The voltage for the core logic can be set based on the application's performance and power requirements. Typically, the backup domain requires an input voltage of 1.4 V to 3.6 V, which can be provided by connecting a backup battery or a super capacitor to the VBACKUP pin. The internal backup switch automatically selects between VDDD and VBACKUP (when VDDD is no longer available) for powering the backup domain peripherals like RTC, WCO, ILO, and backup registers. Some I/O cells are powered from the VBACKUP supply before the internal backup switch. If the application does not require a dedicated backup source, VBACKUP can be connected to VDDD externally to ensure that the I/O cells powered by VBACKUP are functional.

Downloaded from Arrow.com.

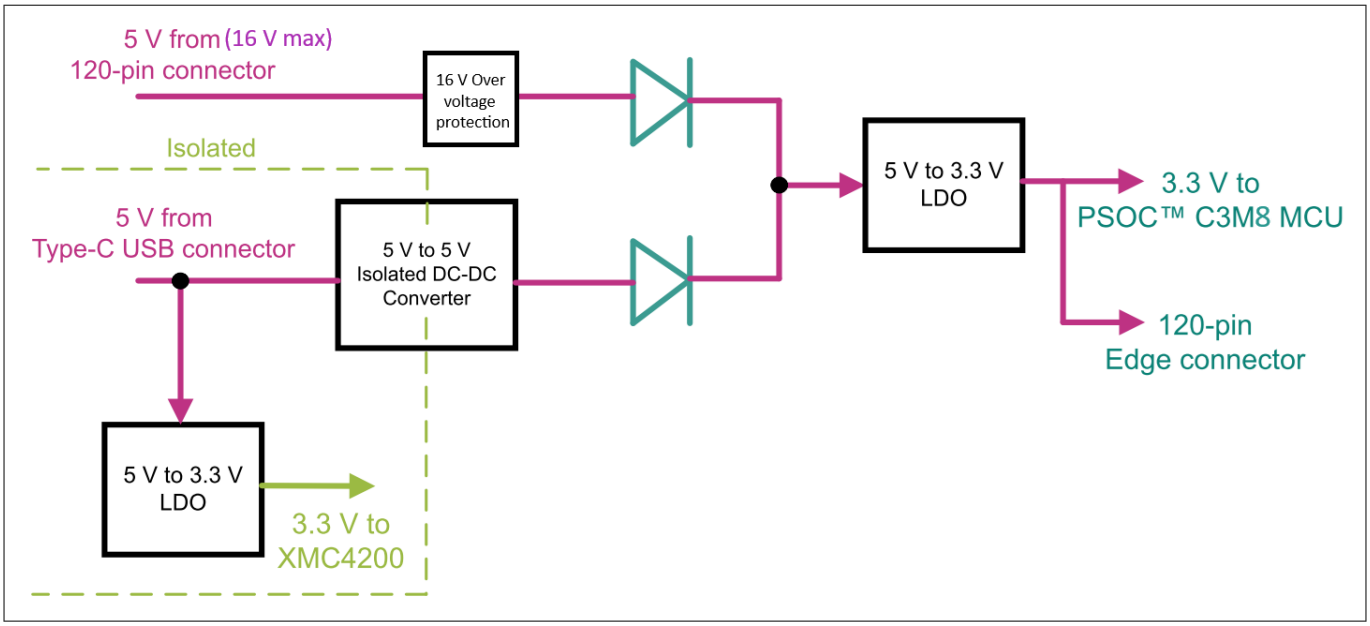


Figure 12 PSOC™ Control C3M8 Digital Power Control Card power tree

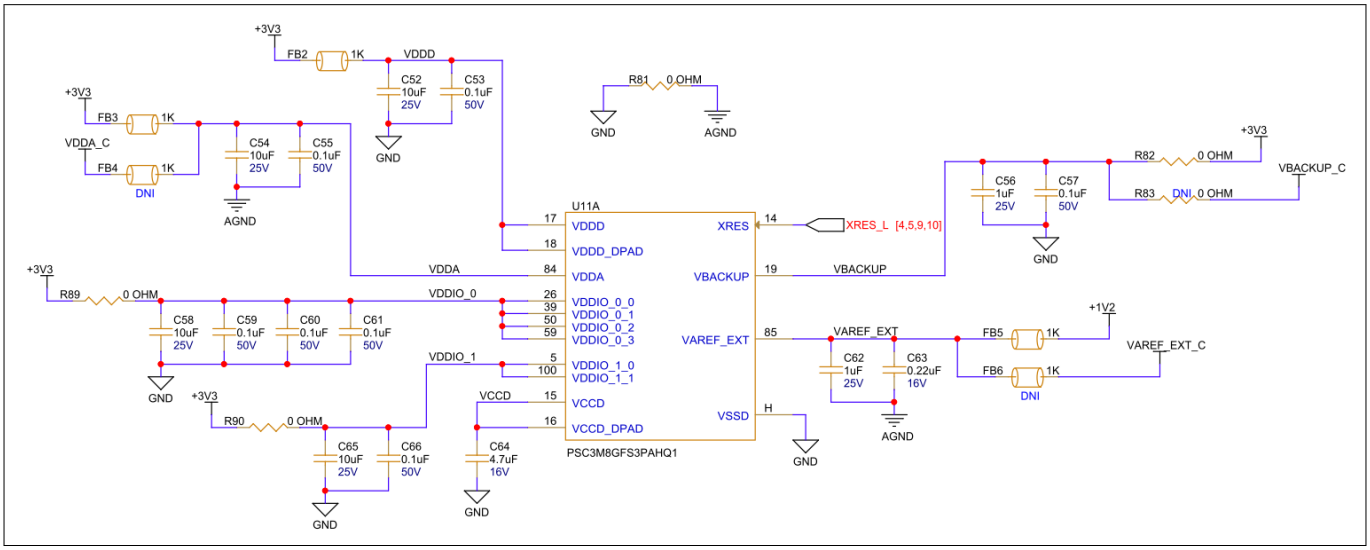


Figure 13 PSOC™ Control C3M8 power supply

Downloaded from Arrow.com.

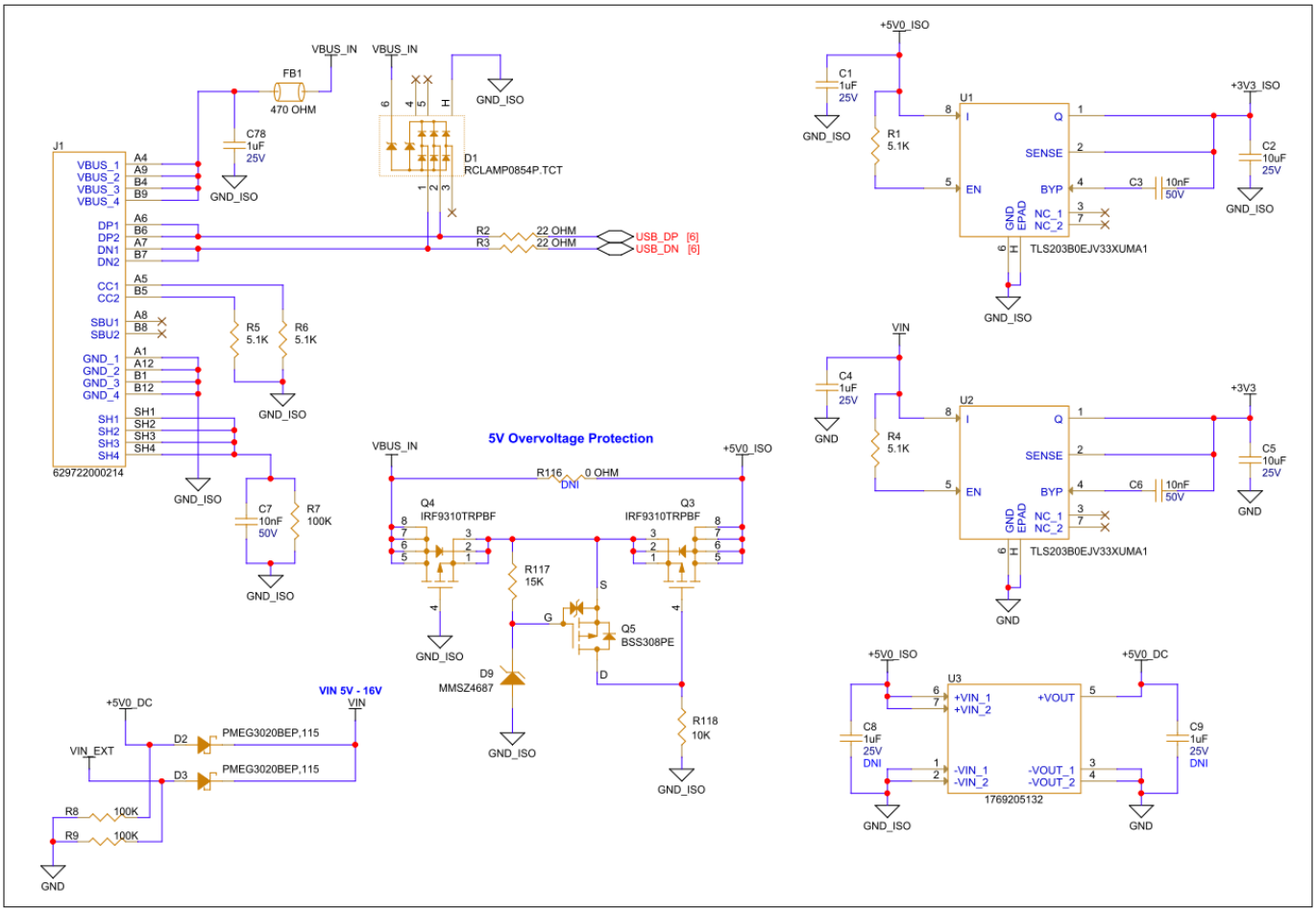


Figure 14 **PSOC™ Control C3M8 Digital Power Control Card power supply (1)**

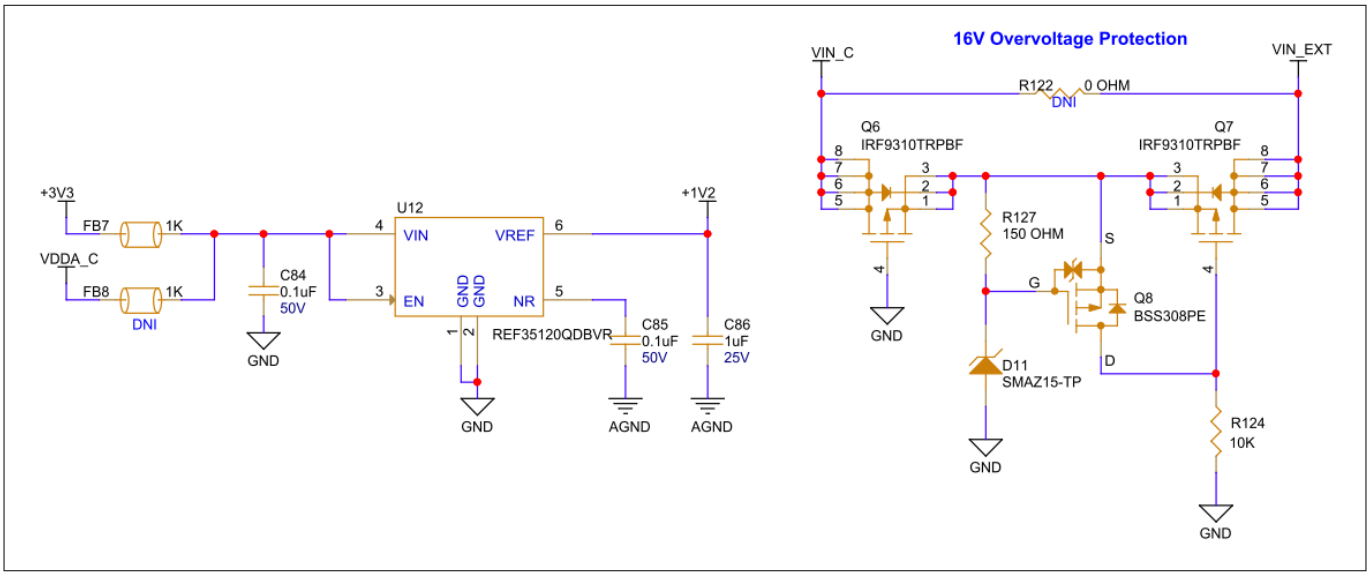


Figure 15 **PSOC™ Control C3M8 Digital Power Control Card power supply (2)**

The control card is fully functional either when connected as a standalone through a USB Type-C connector to an external source, such as a laptop, or by receiving typically 5 V (16 V max) power from the evaluation board via the 120-pin Edge connector. PSOC™ C3M8 is in fact supplied from an isolated 3.3 V LDO, which is powered through an isolated DC-DC 5 V OR' ed with an evaluation board at typically 5 V (16 V max). Control card can support a maximum of 16 V supply from the evaluation boards. A 16 V over voltage protection circuit is

Downloaded from Arrow.com.

implemented for external supply. The XMC4200 JLink is powered by a 3.3 V LDO, which is powered by a USB Type-C connector at 5 V. Also, the 3.3 V generated on the control card is routed to a 120-pin Edge connector for the evaluation board.

3.1.4 PSOC™ Control C3M8 MCU I/Os

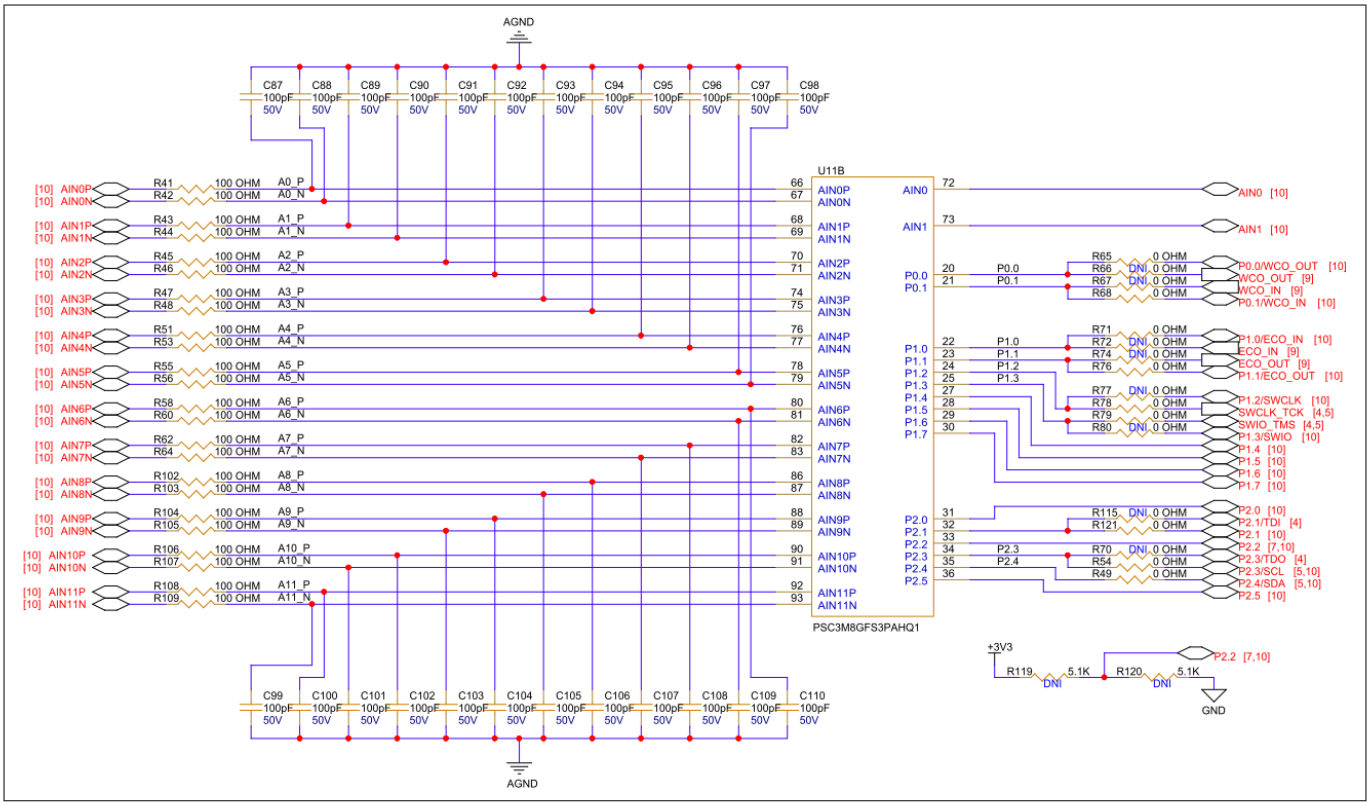


Figure 16 PSOC™ Control C3M8 MCU IOs (1)

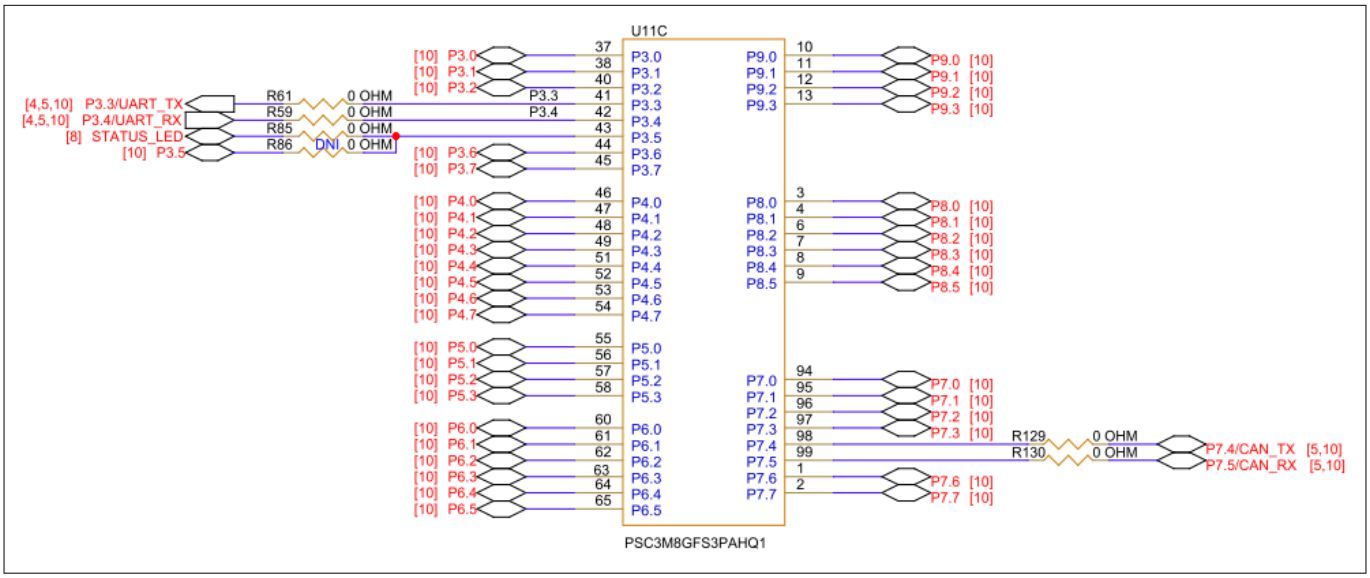


Figure 17 PSOC™ Control C3M8 MCU IOs (2)

The PSOC™ C3M8 Control Card will bring out all the IOs to the 120-pin Edge finger. The ECO, WCO, SWD/JTAG, UART, CAN, and PMBUS pins are dedicated to the board by default and routed to the Edge finger with zero-ohm options.

Downloaded from Arrow.com.

3.1.5 120-pin Edge finger interface

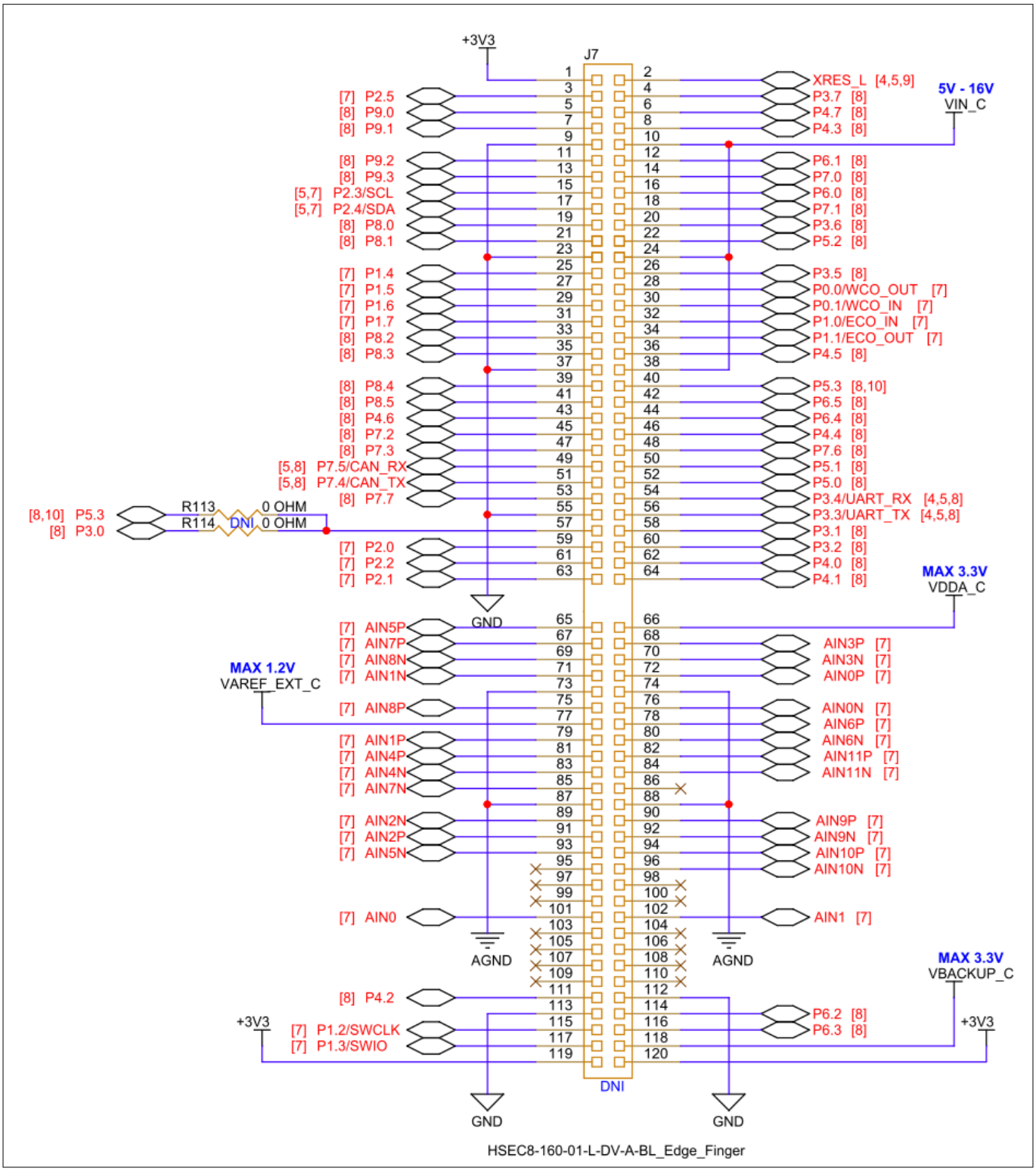


Figure 18 120-pin Edge finger

The control card has a 120-pin Edge finger, which is inserted into a mating connector (HSEC8-160-01-L-DV-A-BL) on evaluation boards. All the IO lines of the PSOC™ C3M8 device are routed to this 120-pin Edge finger. The control card pinout is defined so that it can be used as a generic control card for various types of evaluation boards. There will be different kinds of evaluation boards, such as Dual Buck Evaluation Board, PFC Evaluation Board, and so on. All these evaluation boards are built such that the 120-pin connector on them is compatible

Downloaded from Arrow.com.

with this control card pinout. The edge connector has typically 5 V (16 V max) input supply to the control card and a 3.3 V output supply from the control card.

The following are the signals available on the edge finger:

- 7 pairs of HRPWM signals (line and complementary)
- 12 pairs of ADC analog inputs (positive & negative)
- 2 DAC channels
- 1 UART channel
- 1 PMBUS channel
- 1 CAN channel
- JTAG signals
- 34 general purpose IO pins

3.1.6 Analog-to-digital converter (ADC) input filter

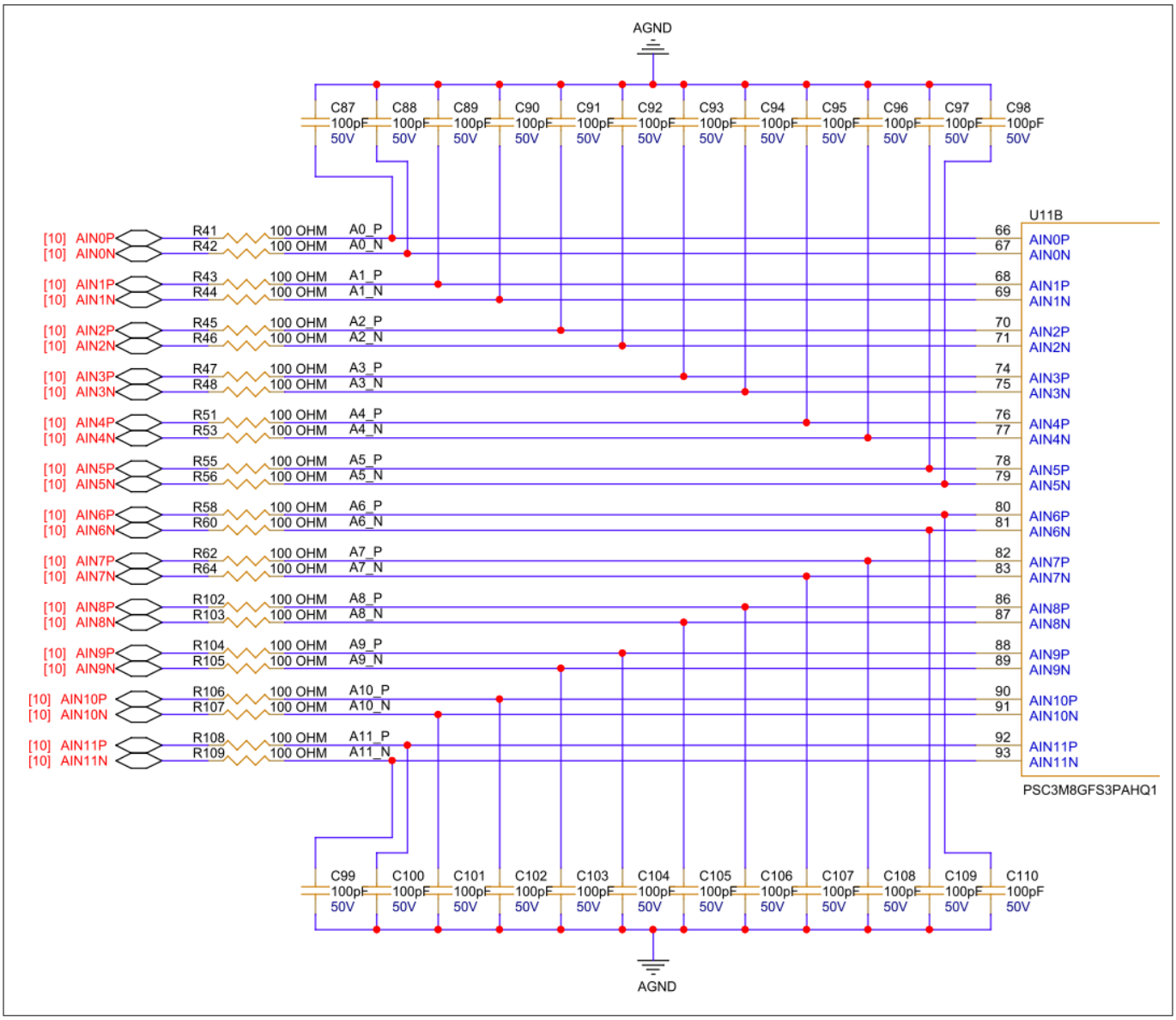


Figure 19 ADC input RC filter

Downloaded from Arrow.com.

All ADC inputs on the control card are filtered with a high-frequency cross-over frequency RC filter, as shown in above figure. This will help to remove undesired high-frequency noise from the input signals. As a result, it will improve the measurement performance of the MCU.

3.1.7 Reset button

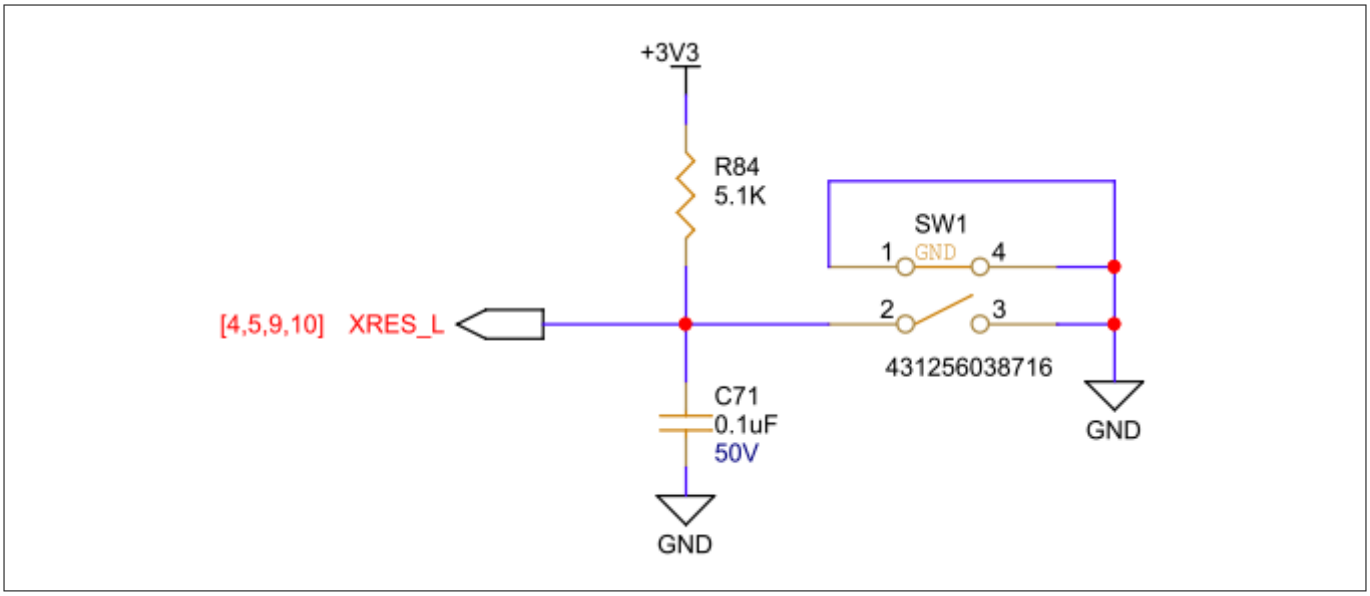


Figure 20 Reset button

The control card contains one reset button (SW1) for resetting the PSOC™ Control C3M8 MCU. When this SW1 button is pressed, the XRES_L line of the PSOC™ Control C3M8 MCU is pulled to the ground, which in turn resets the target device.

3.1.8 LEDs

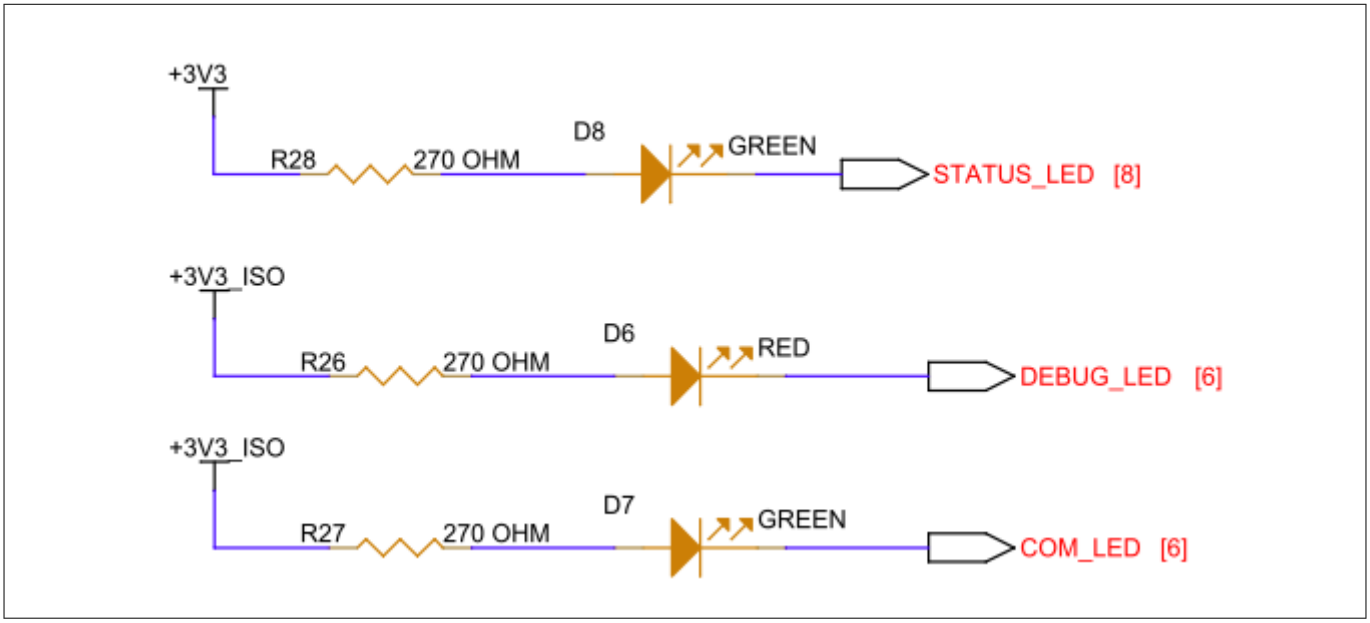


Figure 21 LEDs

The control card contains three discrete LEDs:

Downloaded from Arrow.com.

- One user-controlled LED D8 (green-STATUS LED) is connected to the P3.5 GPIO of the PSOC™ C3M8 MCU. This user LED is active low, so the P3.5 pin must be driven low to turn ON this LED
- Two debug controller LEDs, D6 (red-DEBUG LED) and D7 (green-COM LED), are connected to XMC4200 MCU pins and are not user-controlled

3.1.9 Digital isolators

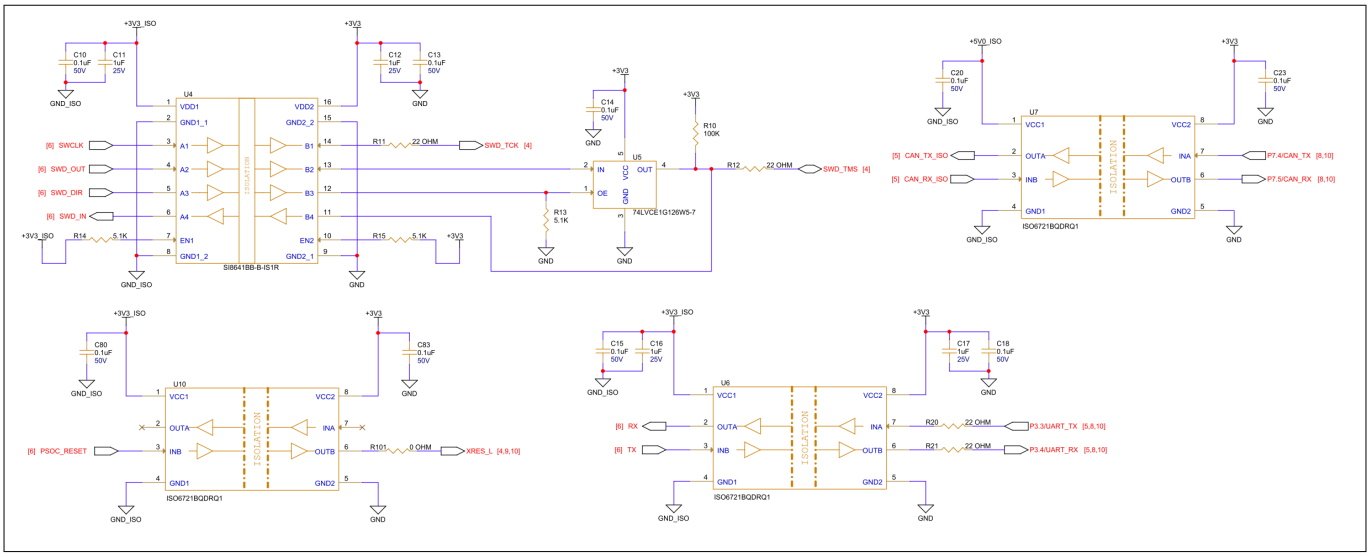


Figure 22 Digital isolators

The control card has an onboard XMC4200-based JLink debugger. All the signals connected between the XMC4200 and PSOC™ C3M8 devices are isolated with digital isolators. These digital isolators can provide capacitive isolation up to 2.5 KVrms. Also, there is a DC-DC isolator that provides 5 V to 5 V isolation between the XMC4200 and PSOC™ C3M8 sides. All the digital isolators are placed on the breakable side of the control card. When the user breaks off the debugger section of the PCB, the control card will not have any isolation. There are a total of four digital isolators on the control card, with 9 (4+2+2+1) channels. A 4-channel digital isolator is used for SWD interface isolation; a 2-channel digital isolator is connected between UART lines; one isolation channel is used to connect the PSOC™ C3M8 XRES pin to the XMC4200 P0.3 pin, and another 2-channel bidirectional digital isolator is used for CAN interface isolation. This isolated CAN interface can be accessed through a 3-pin header (J3).

3.1.10 CAN FD header

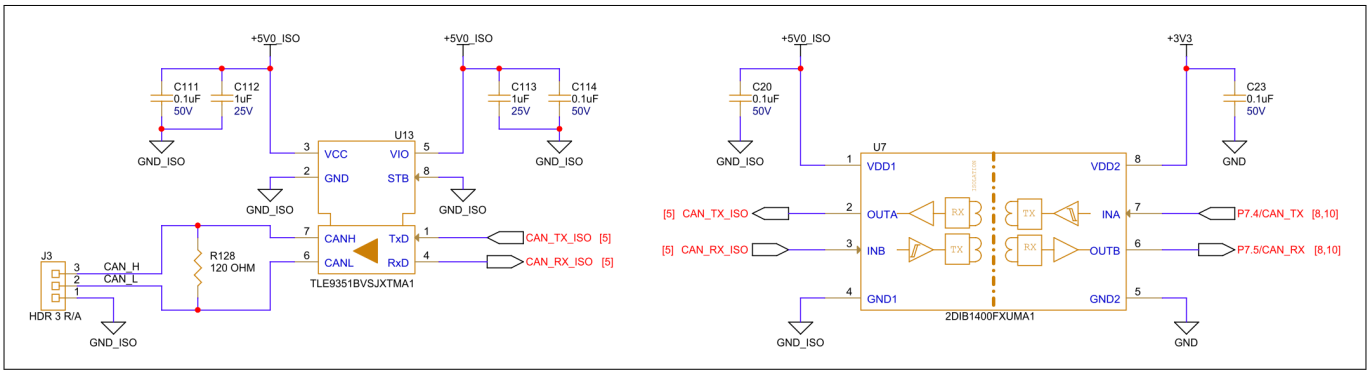


Figure 23 CAN FD

Control card has a CAN FD interface with an on board CAN transceiver and a digital isolator. This isolated CAN FD interface can be accessed through a 3-pin header (J3). This CAN interface is powered through the USB

Downloaded from Arrow.com.

connector J1. CAN transceiver and the digital isolator are placed on the breakable side of the control card. When the user breaks off the debugger section of the PCB, the CAN interface can not be accessed.

3.1.11 PMBUS header

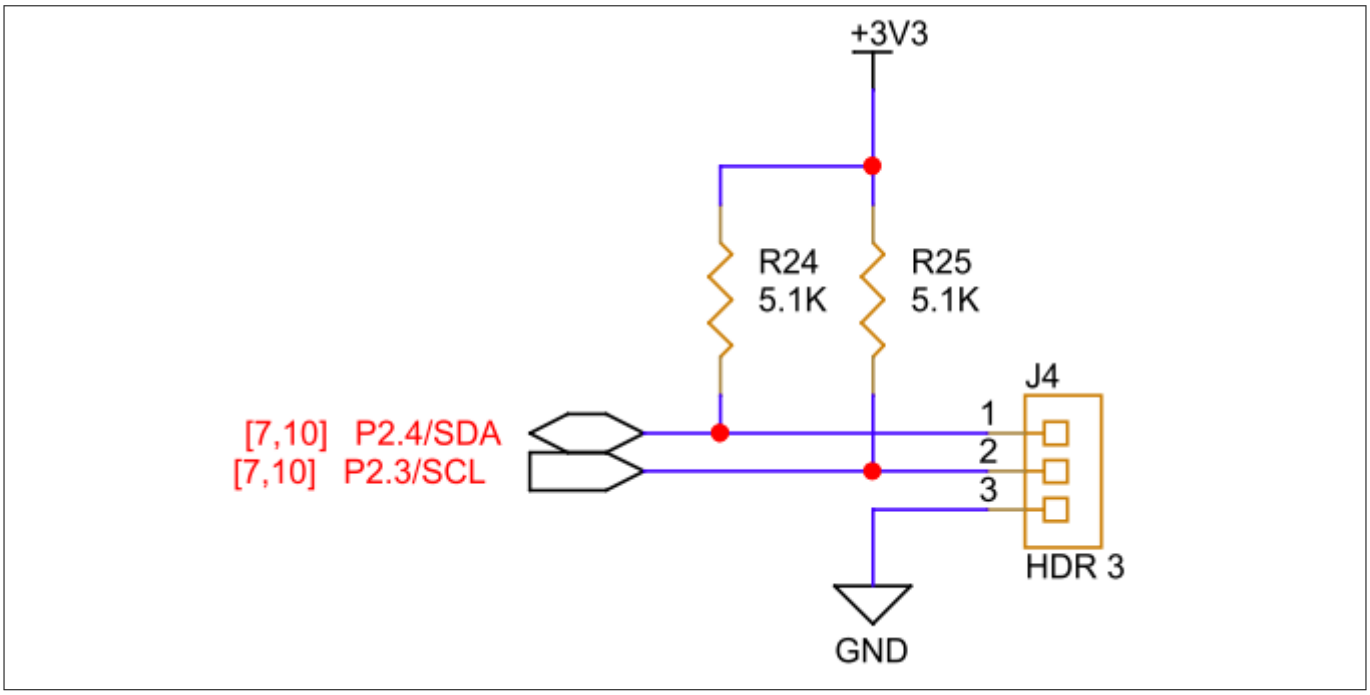


Figure 24 PMBUS

Control card has a PMBUS interface that can be accessed through a 3 pin header J4.

Downloaded from Arrow.com.

3.1.12 PSOC™ C3M8 Interface Board

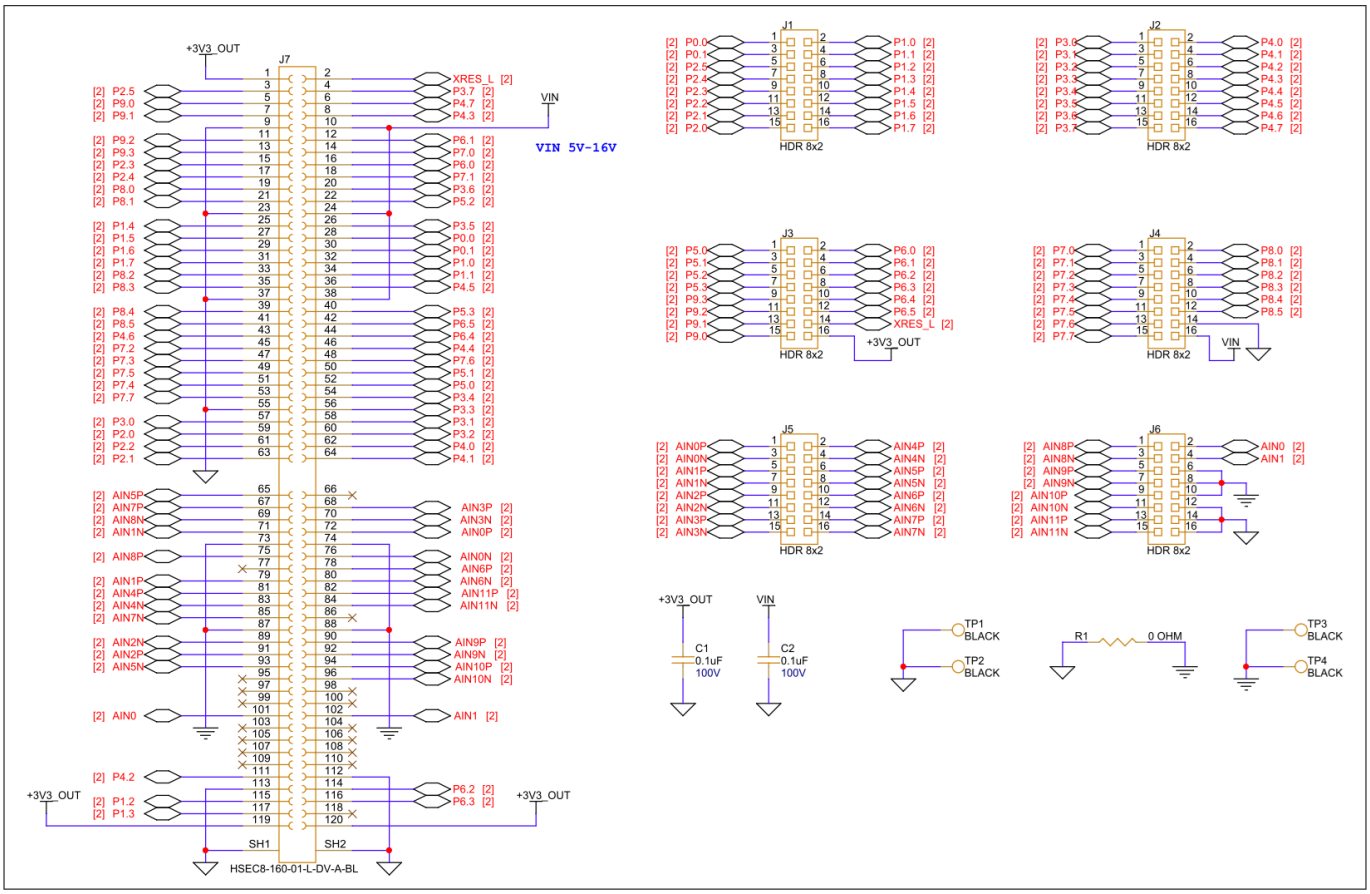


Figure 25 PSOC™ Control C3M8 Interface board schematics

The interface board is made as an interface for the PSOC™ C3M8 Control Card. When no evaluation board is present, this interface board can be used to easily access the IO pins of the PSOC™ C3M8 controller. The interface board has a 120-pin mating connector (HSEC8-160-01-L-DV-A-BL) and six numbers of 2.54 mm 2x8 headers. The interface board does not require any power as it has no active components. When the PSOC™ C3M8 Control Card is not powered through the USB Type-C connector, a typical 5 V input (16 V max) can be supplied to it through the J4 header of the interface board. The control card provides a 3.3 V rail to the interface board, with the current limited to less than 100 mA.

3.1.13 PSOC™ Control C3M8 MCU clock architecture

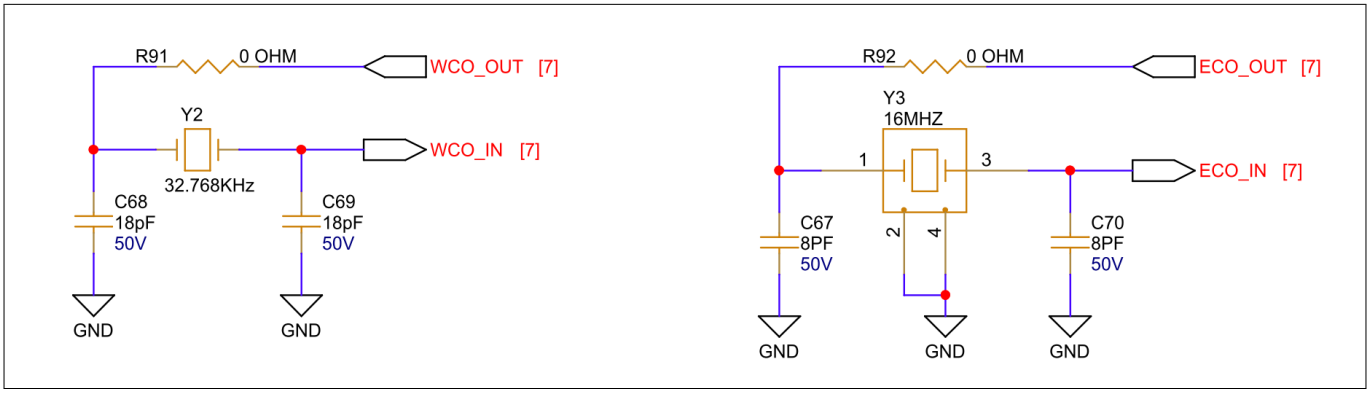


Figure 26 PSOC™ C3M8 clock sources

Downloaded from Arrow.com.

The control card includes 16 MHz ECO (Y3) and 32.768 kHz WCO (Y2) for the PSOC™ Control C3M8 MCU device.

3.1.14 PSOC™ Control C3M8 MCU external program/debug headers

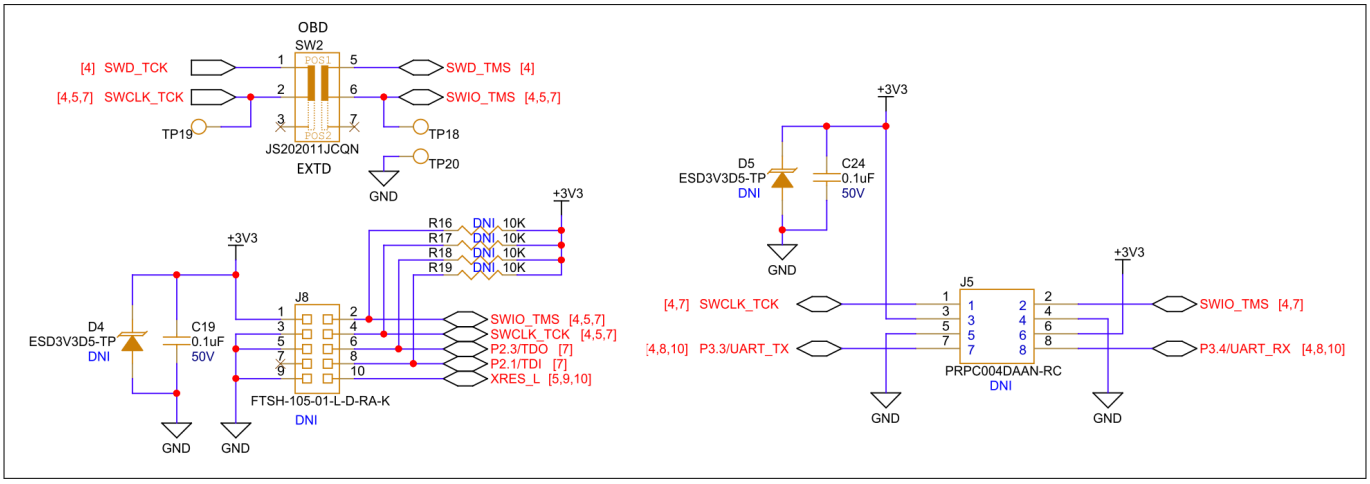


Figure 27 PSOC™ C3M8 external program/debug headers

The control card has an isolated XMC4200 MCU-based JLink programmer/debugger onboard. Alternately, the PSOC™ Control C3M8 MCU can be programmed through a 10-pin SWD/JTAG header (J8) using MiniProg4 or any third-party programmer. Switch SW2 let users select between onboard debugger (OBD) or external debugger (EXTD). The user must make sure that the external debugger box used provides galvanic isolation (typically 1 kV) to avoid damage due to high voltages in the computer.

PSOC™ Control C3M8 MCU or any other onboard peripheral cannot be powered from the 10-pin SWD/JTAG header (J8). This is to protect the external programmer from overloading, making sure that the kit does not draw any current from the external programmer through J8. Additionally, an 8-pin SWD/UART header (J5) is also provided for programming or debugging the PSOC™ Control C3M8 MCU.

PSOC™ Control C3M8 Digital Power Control Card includes two external connector options (J8 and J5) for debugging. The default configuration of the control card is prepared for onboard JLINK debug with switch SW2 set to the OBD position, and therefore, none of the two connector options (J8 and J5) are assembled. If required, the user has to mount the corresponding headers (J8 or J5) and make sure to set the switch SW2 to the EXTD position on the control card.

Downloaded from Arrow.com.

3.1.15 XMC4200 as onboard programmer/debugger

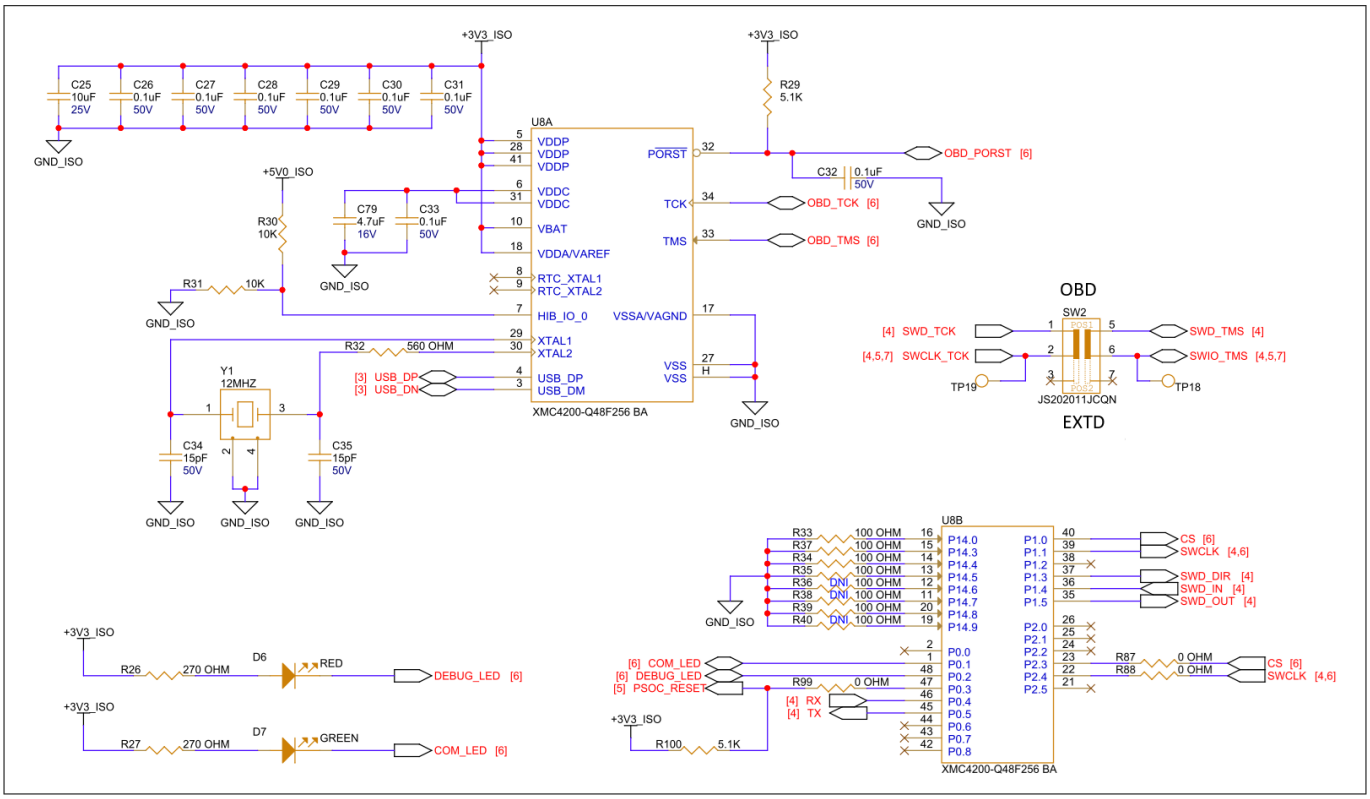


Figure 28 XMC4200 MCU based on board JLink programmer/debugger

The PSOC™ Control C3M8 Digital Power Control Card supports on board isolated debug interface:

- XMC4200-based JLink-isolated On-Board Debugger (OBD). Switch SW2 is set to the OBD position to support the onboard debugger. This is the default connection. It is powered through a USB Type-C connector (5 V) converted to an isolated 3.3 V
- The control card includes a debugger controller and isolation up to 2.5 kV to protect the computer. Connect the Control card to a computer with a USB cable.

The on board debugger (OBD) supports:

- Serial Wire Debug (SWD)
- UART communication via a virtual COM port

***Note**: The firmware of the OBD requires the latest JLink driver and a serial port driver (CDC driver) installed on your computer. Check "Install J-Link Serial Port Driver" when installing the latest JLink driver.*

Downloaded from Arrow.com.

3.1.16 Removing the onboard debugger

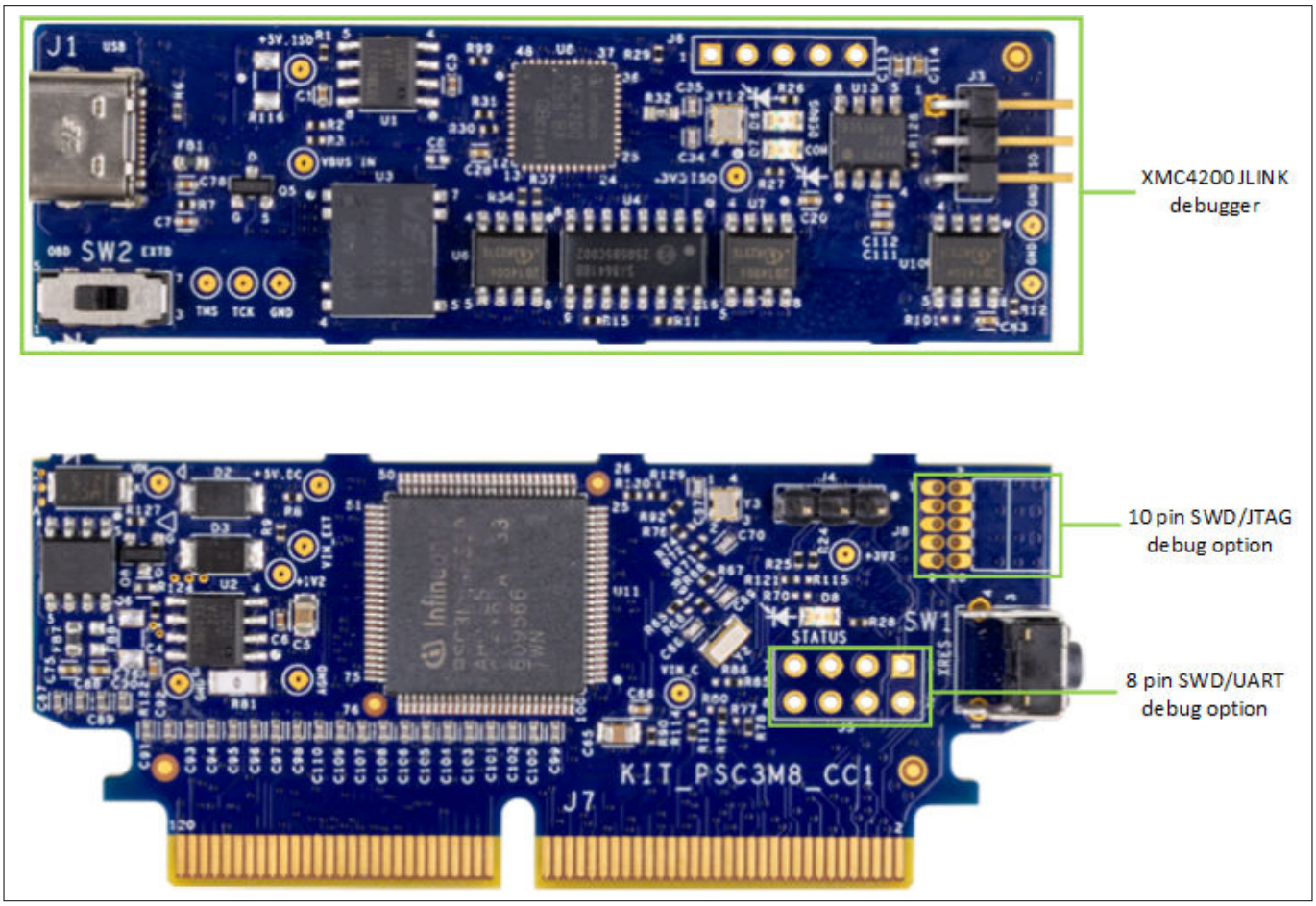


Figure 29 Debug options when removing debugger part of control card

PSOC™ Control C3M8 Digital Power Control Card can be broken off into two parts by breaking the PCB, as shown in above Figure. This will reduce the size of the main controller part so that it can fit into 1U standard-sized rack systems once programmed. The control card can still be debugged in two different ways if the debugger part is removed.

1. Connecting a ribbon cable to an 8-pin connector (J5) or,
2. Using the 10-pin connector (J8) option with an external debugger box

By default, these connectors (J8 and J5) are not loaded. The user can install these connectors when the onboard debugger is broken. When the onboard debugger is not broken and these J5 or J8 connectors are installed, then the user must make sure to set the switch SW2 to the EXTD position to make the external debugger work.

***Note**: When using external debuggers, make sure that the debugger box includes galvanic isolation for the computer. If the control card is exposed to high voltages, this can cause damage to the computer.*

Downloaded from Arrow.com.

4 Production data

The board has been designed with Allegro. The full PCB design data (schematics, layout, and BOM) of this board can also be downloaded from the kit webpage.

Downloaded from Arrow.com.

Revision history

Document version	Date of release	Description of changes
**	2025-08-05	Initial release
*A	2026-03-31	Updated: • Getting started • Creating a project and program/debug using ModusToolbox™ software • Figure 22
*B	2026-07-01	Published to web

Downloaded from Arrow.com.

Trademarks

PSOC™, formerly known as PSoC™, is a trademark of Infineon Technologies. Any references to PSoC™ in this document or others shall be deemed to refer to PSOC™.

Downloaded from Arrow.com.

Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

Edition 2026-07-01

Published by

Infineon Technologies AG

81726 Munich, Germany

© 2026 Infineon Technologies AG

All Rights Reserved.

Do you have a question about any aspect of this document?

Email: erratum@infineon.com

Document reference

IFX-wqq1749720925042

Important notice

This evaluation board, demonstration board, reference board or kit and documentation (“Evaluation Board”) is sold or provided and delivered by Infineon Technologies AG and its affiliates (“Infineon”). Evaluation Boards are part of Infineon’s non-serial products.

This Evaluation Board is delivered to customer "AS IS", without any warranty (whether express or implied) or liability of Infineon of any kind, including but without limitation any warranty of merchantability, fitness for a particular purpose or non-infringement. These limitations and exclusions shall not apply in case of Infineon's willful misconduct or in any other case where liability is mandatory at law.

This Evaluation Board shall only be used by customer for test purposes and not for series production. However, the Evaluation Board shall not to be used for reliability testing. The Evaluation Board is exclusively intended for technically qualified and skilled customer representatives. The Evaluation Board shall not be used in any way where a failure of the Evaluation Board, or any consequences of the use thereof, can reasonably be expected to result in personal injury.

Evaluation Boards may not comply with CE or similar standards (including without limitation the EMC Directive 2004/EC/108 and the EMC Act) and may not fulfill other requirements of the country in which they are operated by the customer. The customer shall ensure that each Evaluation Board will be handled in a way which is compliant with all relevant requirements and standards in the country in which it is operated. Software and associated documentation and materials included or referenced in the Evaluation Board (“Software”) is owned by Infineon and is protected by and subject to worldwide patent protection, worldwide copyright laws, and international treaty provisions. Therefore, you may use this Software only as provided in the license agreement accompanying the software package from which you obtained this Software. If no license agreement applies, then any use, reproduction, modification, translation, or compilation of this Software is prohibited without the express written permission of Infineon.

Unless otherwise expressly agreed with Infineon, this Software is provided to customer "AS IS", without any warranty (whether express or implied) or liability of Infineon of any kind, including but without limitation any warranty of merchantability, fitness for a particular purpose or non-infringement. These limitations and exclusions shall not apply in case of Infineon's willful misconduct or in any other case where liability is mandatory at law. Infineon reserves the right to make changes to the Software without notice. You are responsible for properly designing, programming, and testing the functionality and safety of your intended application of the Software, as well as complying with any legal requirements related to its use. Infineon does not guarantee that the Software will be free from intrusion, data theft or loss, or other breaches (“Security Breaches”), and Infineon shall have no liability arising out of any Security Breaches. The Software shall not be used in any way where a failure of the EvaluationBoard, or any consequences of the use thereof, can reasonably be expected to result in personal injury.

Safety & Operating Instructions:
Customer shall check the Evaluation Board for any physical damage which may have occurred during transport. If customer detects any damages or defects in the Evaluation Board, customer shall not connect the Evaluation Board to a power source. Customer shall contact Infineon for further support. If customer observes unusual operating behavior during the evaluation process, customer shall immediately shut off the power supply to the Evaluation Board and consult Infineon for support.
Customer shall not touch the Evaluation Board during operation and keep a safe distance.
Customer shall not touch the Evaluation Board after disconnecting the power supply, several components may still store electrical voltage and can discharge through physical contact. Several parts, like heat sinks and transformers, may still be very hot. Allow the components to cool before touching or servicing.
The electrical installation must be completed in accordance with the appropriate safety requirements.

Downloaded from Arrow.com.