PolarFire SoC Icicle Kit User Guide

Introduction (Ask a Question)

The PolarFire® SoC FPGA Icicle Kit (MPFS-ICICLE-KIT) is an RoHS-compliant, cost-optimized kit with general-purpose interfaces that enables you to evaluate features of the PolarFire SoC family of FPGAs.

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Table of Contents

Introduction....1

1. Getting Started....3
   - 1.1. Kit Contents....3
   - 1.2. Block Diagram....3
   - 1.3. Web Resources....4
   - 1.4. Board Overview....4
   - 1.5. Handling the Board....7
   - 1.6. Operating Temperature....7
   - 1.7. Powering Up the Board....7

2. Installation and Settings....8
   - 2.1. Software Settings....8
   - 2.2. Hardware Settings....8
   - 2.3. Power Sources....10

3. Board Components and Operations....13
   - 3.1. LDDR4 Memory Interface....13
   - 3.2. SPI Serial Flash....13
   - 3.3. eMMC and SDIO Interface....13
   - 3.4. High Speed Transceivers Configuration....14
   - 3.5. Communication Interfaces....14
   - 3.6. Expansion Capabilities....14
   - 3.7. Voltage and Current Monitoring....15
   - 3.8. GPIO....15
   - 3.9. User Interface....15
   - 3.10. Mux for JTAG Selection....16
   - 3.11. Programming Scheme....16
   - 3.12. System Reset....16
   - 3.13. 50 MHz Oscillator....16

4. Pin List....18

5. Board Component Placement....19

6. Demo Design....21

7. Appendix: Programming PolarFire SoC FPGA Using the On-Board Programmer....22

8. Revision History....23

Microchip FPGA Support....24

Microchip Information....25
   - Trademarks....25
   - Legal Notice....25
   - Microchip Devices Code Protection Feature....25

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1. Getting Started (Ask a Question)

The PolarFire SoC Icicle Kit supports the following interfaces:

- PCI Express Root Port
- eMMC (DDR Model/HS200/HS400)
- SD card
- LPDDR4
- SGMII
- I^2C-Power Monitor
- USB
- UART
- CAN
- mikroBUS
- 40 pin Raspberry Pi 4 interface connector

The PolarFire SoC device available on Icicle Kit is programmed using the on-board FlashPro6 programmer. The on-board FlashPro6 programmer is used to develop and debug embedded applications using SoftConsole, Identify, or SmartDebug.

Note: Embedded FlashPro6 is enabled only for the production kits. For PROTO kits, the device can be programmed using an external FlashPro 4, 5, or 6 programmer.

1.1. Kit Contents (Ask a Question)

The following table lists the contents of the PolarFire SoC Icicle Kit.

Table 1-1. Kit Contents

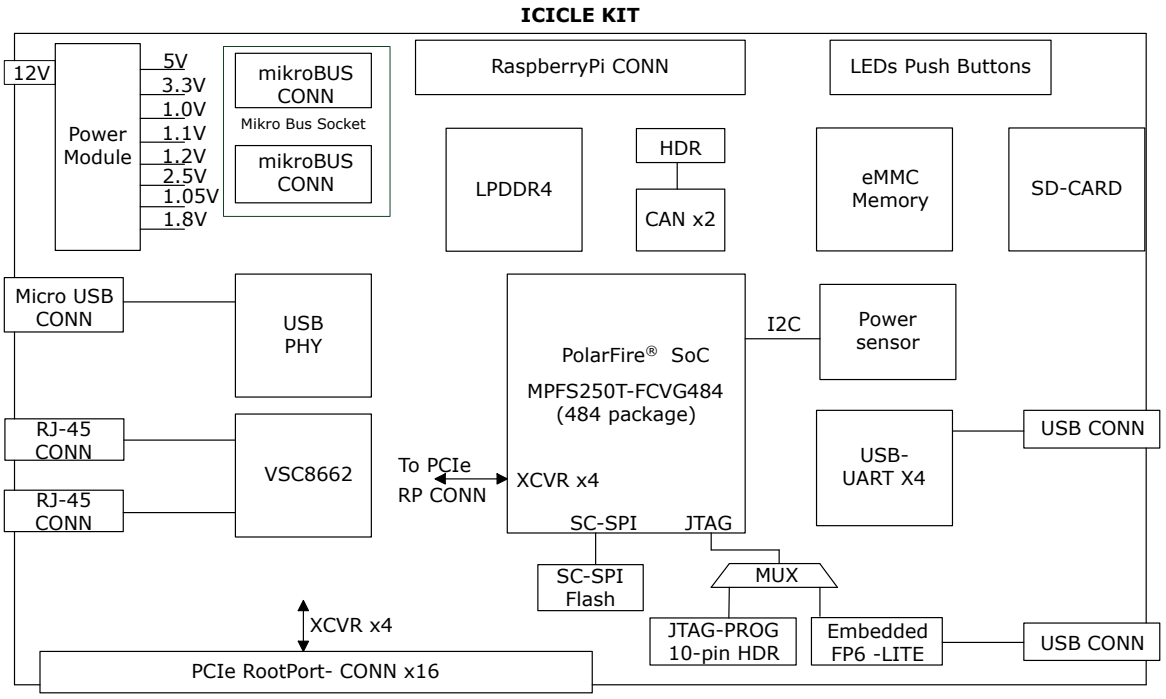
Item	Quantity
PolarFire SoC FPGA Icicle Kit featuring the MPFS250T-FCVG484E device with 254 K logic elements	1
12 V/5 A wall-mounted power adapter	1
Ethernet cable	1
USB 2.0 micro AB connector for UART interface to PC	1
Quickstart card	1

1.2. Block Diagram (Ask a Question)

The following block diagram shows the key components of the PolarFire SoC Icicle Kit.

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Figure 1-1. PolarFire SoC Icicle Kit Block Diagram



1.3. Web Resources (Ask a Question)

For more information, see the PolarFire SoC Icicle Kit web page.

1.4. Board Overview (Ask a Question)

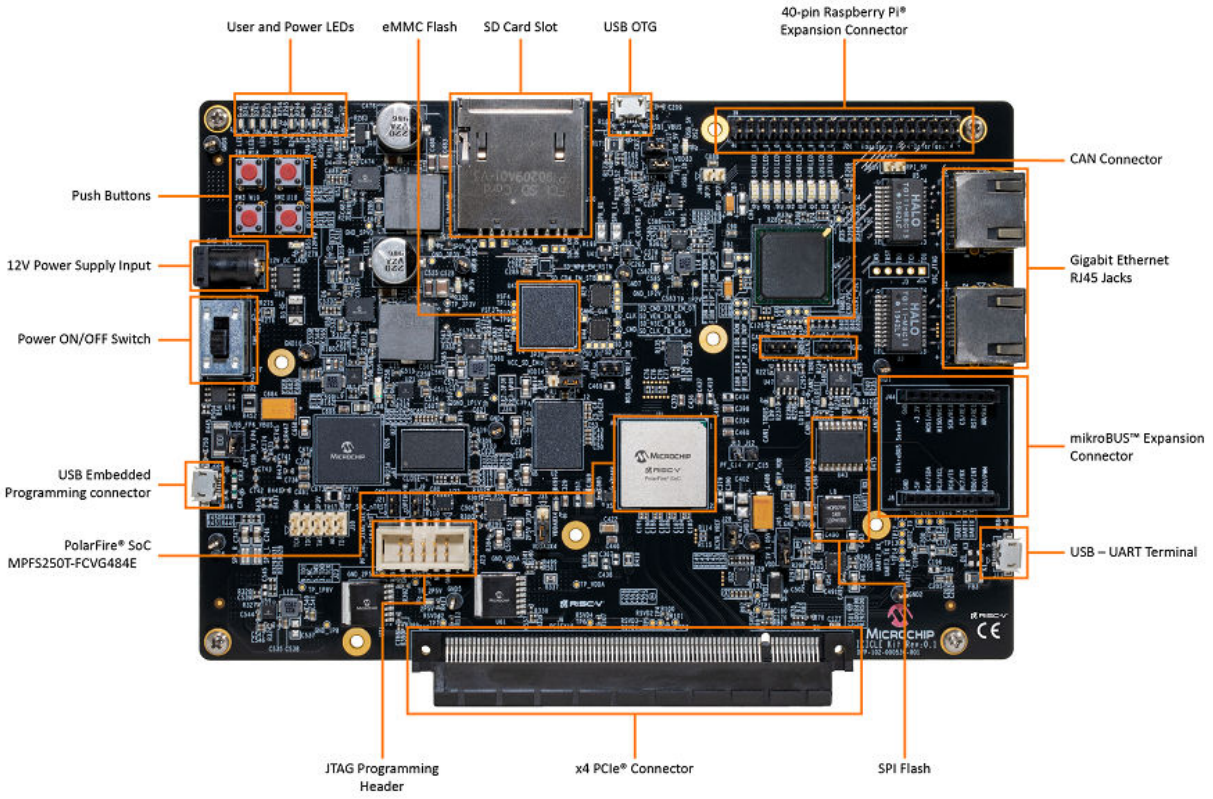
The PolarFire SoC Icicle Kit features a MPFS250T-FCVG484E FPGA with the following capabilities:

- VSC8662 with two RJ45 connectors for 10/100/1000 Mbps Ethernet
- LPDDR4 memory
- Power monitor module
- PCIe root port
- One SPI flash device
- 40 pin raspberry Pi 4 interface connector
- mikroBUS expansion port

The following illustration highlights various components of the PolarFire SoC Icicle Kit.

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Figure 1-2. PolarFire SoC Icicle Kit



1.4.1. Form Factor (Ask a Question)

The following are the dimensions of PolarFire SoC Icicle Kit.

- Form factor is 7.2 x 4.95 inches.
- Maximum height of the component at the top side: 0.59 inches.
- Maximum height of the component at the bottom side: 0.51 inches.

1.4.2. FPGA Bank IO Assignment for Individual Interfaces (Ask a Question)

Table 1-2. FPGA Bank Assignment

Interfaces	FPGA Bank Allocation
LPDDR4	B6
SGMII	B5, B1, B9, and B2
PCI	XCVRO, B1, B9
mikroBUS	B1, B9, and B2
USB-UART (x4)	B1, B9
USB interface	B2
SC-SPI_FLASH	B3
JTAG Header	B3
eMMC/SDIO	B4
CAN	B2, B1

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Table 1-2. FPGA Bank Assignment (continued)

Interfaces	FPGA Bank Allocation
Raspberry Pi 4 interface connector	B1
User defined LEDs/Switches	B0

The following table lists the important components of the PolarFire SoC Icicle Kit.

Table 1-3. PolarFire SoC Icicle Kit Components

Component	Label on Board	Description
Featured Device		
PolarFire SoC FPGA		MPFS250T-FCVG484E Extended Commercial (0 °C to 100 °C) temperature support.
Power Supply and Monitoring		
12V power supply input	J29	The board is powered by a 12 V power source using an external +12 V/5 A DC jack.
ON/OFF switch	SW6	Power ON/OFF switch from +12 V external DC jack.
Clocks		
On-board 50 MHz oscillator	X5	50 MHz clock oscillator (DSC1001DL5-050.0000) with single-ended output.
On-board 125 MHz oscillator	X2	125 MHz oscillator (DSC1123BL5-125.0000) with differential LVDS output which is the input to the MSS Reference clk.
FPGA Programming and Debugging		
SPI flash	U43	1 Gb Micron MT25QL01GBBB8ESF-0SIT SPI flash memory device connected to SPI pins on bank3 of the PolarFire SoC device.
JTAG programming header	J23	Header to program and debug the PolarFire SoC device using FlashPro. The appropriate programmer must be selected in the FlashPro software. **Note:** For PROTO kits, the device can be programmed using an external FlashPro 4, 5, or 6 programmer.
Embedded FlashPro 6	U26	On-board programming.
Expansion Interfaces		
mikroBUS	J44, J8	mikrobus connector.
Raspberry Pi 4	J26	Raspberry Pi 4 interface connector.
PCIe X 16	J6	PCI Express Root port connector.
Communication Interfaces		
1000Base-X Gigabit Ethernet Transceiver RJ45 conn-2	J1, J2	Ethernet (RJ45) jack with external magnetics interfacing with VSC8662 in SGMII mode.
USB-UART	J11	USB Micro AB connector.
CAN	J25, J27	CAN Headers.
USB-ULPI	J16	USB Micro AB connector.
Memory Chips		
LPDDR4	U2	MT53D512M32D2DS-053 WT:D TR is used for LPDDR4 interface. Memory size: 16 Gb.
eMMC	U45	SDINBDG4-8G eMMC is used for this interface. Memory size: 8 GB.
SD card	J30	SD connector.
General Purpose I/O		
Debug Switches	SW1 to SW4	For debug.
Light-emitting diodes (LEDs)	LED1 to LED4	Four active-high LEDs connected to some of the user I/Os for debugging.

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1.5. Handling the Board (Ask a Question)

Pay attention to the following points while handling or operating the board to avoid possible damage or malfunction:

- Handle the board with electrostatic discharge (ESD) precautions to avoid damage.
- Power down the board to switch between the programming headers J17 and PCIe CONN (CON1).

1.6. Operating Temperature (Ask a Question)

Extended commercial temperature range (0 °C to 100 °C).

1.7. Powering Up the Board (Ask a Question)

To power up the board, do the following:

1. Connect 12 V/5 A power supply brick to J29.
2. Slide switch SW6 to ON position.
3. Power status LEDs 12P0, 5P0, 2P5V, VDDAUX4, 3P3V, VDD, 1P8, 1P1V_LPDDR4, and VDDA will glow.
4. Install the software required for developing designs and set the jumpers for the pre-programmed design. For more information, see Installation and Settings.

The following table provides the probing points for power rails.

Table 1-4. Power Measurements

#	Power Rail	Probing Point	Tolerance Allowed	Expected Voltage (in Volt)
1	12P0V	C476	±5%	12V
2	5P0V	C482	±5%	5V
3	1P8V	C542	±5%	1.8V
4	2P5V	C786	±5%	2.5V
5	1P5V_DDR3	C602	±5%	1.5V
6	0P75V_VTT_DDR3	C514	±5%	0.75V
7	VDD	C499	±3%	1V
8	1P1V_LPDDR4	C574	±5%	1.1V
9	1P2V_PHY_VSC_FP6	C587	±5%	1.2V
10	3P3V	C527	±5%	3.3V
11	VDDA	C556	±3%	1.05V

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2. Installation and Settings (Ask a Question)

This section provides information about the software and hardware settings required to run the pre-programmed demo design on the PolarFire SoC Icicle Kit.

2.1. Software Settings (Ask a Question)

1. Download and install the latest release of Libero SoC software.
2. Generate a free silver license for your software. The Libero SoC installer includes FlashPro5 drivers.
3. For more information about installing SoftConsole, see the SoftConsole page.
4. For instructions about installing Libero SoC, see the Libero SoC Documentation.
5. For more information about downloading and installing Microchip's DirectCores on the Host PC where Libero SoC is installed, see IP Core Tools.
6. For more information about downloading and installing Microchip's firmware drivers on the Host PC where Libero SoC is installed, see the Firmware Catalog Documentation.

2.2. Hardware Settings (Ask a Question)

This section provides information about jumper settings, switches, and LEDs on the PolarFire SoC Icicle Kit.

2.2.1. Jumper Settings (Ask a Question)

The following table lists the default jumper settings on board.

Table 2-1. Jumper Settings

Jumper	Description	Pin	Default Setting
J31	To select LPDDR4 Vref	—	Open
J9	Select pin for programming FPGA with external FlashPro header or with on-board programmer.	—	Open
J21	To select PolarFire SoC JTAG reset.	—	Open
J46	To select 3.3 V for RPI connector from the Icicle Kit	—	Open
J47	To select 5 V for RPI connector from the Icicle Kit	—	Open
J15	To select USB ID	Short pin 1-2	—
J17	5 V for VBUS switch for USB3340	Short pin 1-2	—
J43	To select 1.8 V 0r 3.3 V for eMMC modes	Short pin 1-2	—
J28	Jumper for PolarFire SoC Serdes Vref	Short pin 1-2	—
J24	5 V for VBUS switch for USB3320	Short pin 1-2	—
J34	To select 1.8 V or 3.3 V for BANK4 voltage	Short pin 1-2	—
J35	To select 2.5 V or 3.3 V for BANK4 Aux voltage	Short pin 1-2	—
J45	To select 1 V or 1.05 V for VDD core voltage	Short pin 1-2	—

2.2.2. Power Supply LEDs (Ask a Question)

The following table lists the power supply LEDs on the PolarFire SoC Icicle Kit.

Table 2-2. Power Supply LEDs

LED	Description
12P0	12 V power supply
5P0	5 V power supply
2P5V	2.5 V power supply
VDDAUX4	Bank4 Aux voltage

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Table 2-2. Power Supply LEDs (continued)

LED	Description
3P3V	3.3 V power supply
VDD	Core voltage
1P8	1.8 V power supply
1P1V_LPDDR4	LPDDR4 voltage
VDDA	Power for Serdes channels

2.2.3. Test Points (Ask a Question)

The following test points are available on the PolarFire SoC Icicle Kit.

Table 2-3. Test Points

Test Point	Description
GND1TP_BLK to GND10TP_BLK	Test point for Ground
SD_D0	Test point for SD_DATA0/eMMCMC_DATA0 at Mux
SD_D1	Test point for SD_DATA1/eMMCMC_DATA1 at Mux
SD_D2	Test point for SD_DATA2/eMMCMC_DATA2 at Mux
SD_D3	Test point for SD_DATA3/eMMC_DATA3 at Mux
SD_CLK	Test point for SD_CLK/eMMC_CLK at Mux
SD_CMD	Test point for SD_CMD/eMMC_CMD at Mux
eMMC_CLK	Test point for eMMCMC_CLK at eMMCMC device
SDC_CLK	Test point for SD_CLK at SD connector
SDC_CMD	Test point for SD_CMD at SD connector
SDC_D3	Test point for SD_DATA3 at SD connector
SDC_D2	Test point for SD_DATA2 at SD connector
SDC_D1	Test point for SD_DATA1 at SD connector
SDC_D0	Test point for SD_DATA0 at SD connector
SD_CLK_FB_EM_D4	Test point for SD_CLK_FB/eMMC_DATA4 at Mux
SD_VSEL_EM_D5	Test point for SD_VSEL/eMMC_DATA5 at Mux
SD_CMD_DIR_EM_D7	Test point for SD_CMD_DIR/eMMC_DATA7 at Mux
SD_WP#_EM_RSTN	Test point for SD_WP#/eMMC_RSTN at Mux
SD_CD#_EM_STB	Test point for SD_CD#/eMMC_STB at Mux
TP19-UART0 TX Togg	Test point for UART0 TX Togg
TP17-UART0 RX Togg	Test point for UART0 RX Togg
TP16-UART1 TX Togg	Test point for UART1 TX Togg
TP15-UART1 RX Togg	Test point for UART1 RX Togg
TP12-UART2 TX Togg	Test point for UART2 TX Togg
TP13-UART2 RX Togg	Test point for UART2 RX Togg
TP14-UART3 TX Togg	Test point for UART3 TX Togg
TP18-UART3 RX Togg	Test point for UART3 RX Togg
XTAL2_VSC	Test point for XTAL2 for Phy
RCLK1_VSC	Test point for Phy recovered clk1
RCLK2_VSC	Test point for Phy recovered clk2
CKO_VSC	Test point for Phy clkout
THMDA1	Test point for THMDA1
FIBR_DIP_1	Test point for PHY_Serdes receiver input pair
FIBR_DIN_1	Test point for PHY_Serdes receiver input pair
FIBR_DOP_1	Test point for PHY_Serdes transmitter output pair

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Table 2-3. Test Points (continued)

Test Point	Description
FIBR_DON_1	Test point for PHY_Serdes transmitter output pair
FIBR_DIP_0	Test point for PHY_Serdes receiver input pair
FIBR_DIN_0	Test point for PHY_Serdes receiver input pair
FIBR_DOP_0	Test point for PHY_Serdes transmitter output pair
FIBR_DON_0	Test point for PHY_Serdes transmitter output pair
TP1 to TP6 -	Test points for PCIe reserved pins
TP_VDD	Test point for VDD_core voltage
TP_1P1V	Test point for 1.1 V
GND_1P1V	Test point for 1.1V_Ground
TP_1P2V	Test point for 1.2 V
GND_1P2V	Test point for 1.2V_Ground
TP_3P3V	Test point for 3.3 V
TP_VDDA	Test point for VDDA voltage
TP_2P5V	Test point for 2.5 V
TP_1P8V	Test point for 1.8 V
TP_5P0V	Test point for 5 V
GND_1P8V	Test point for 1.8V_Ground

2.3. Power Sources (Ask a Question)

The PolarFire SoC Icicle Kit uses power supply devices. For more information about these power supply devices, see the Power Management web page.

The following table lists the key power supplies required for normal operation of the PolarFire SoC Icicle Kit.

Table 2-4. I/O Voltage Rails

Supply Name	Description	Value (in Voltage)
VDD	Core Power	1.0/1.05
VDD25	Power for PLL/ICB/Bank Controller/PNVM/Programming Analog block	2.5
VDDA	Power for SerDes RX Channels [3:0] Power for SerDes TX Channels [3:0]	1.0/1.05
VDDA25	Power for SerDes PLLs	2.5
VDD18	HSIO/MSS_DDR Receiver Input Power SE Corner Oscillator Power for programming blocks, analog block and SW Corner Oscillator	1.8
VDDI0	HSIO Bank Power	1.2, 1.5, 1.8
VDDI1	GPIO Bank Power	1.2, 1.5, 1.8, 2.5, 3.3
VDDI2	MSSIO Bank Power	1.2, 1.5, 1.8, 2.5, 3.3
VDDI3	Power for JTAG Ios	1.8, 2.5, 3.3
VDDI4	MSSIO Bank Power	1.2, 1.5, 1.8, 2.5, 3.3
VDDI5	MSS SGMII Bank Power and Pre-Driver	2.5, 3.3
VDDI6	MSS DDR (HSIO) Bank Power	1.2, 1.5, 1.8
VDDI7	GPIO Bank Power	1.2, 1.5, 1.8, 2.5, 3.3
VDDI8	HSIO Bank Power	1.2, 1.5 1.8
VDDI9	GPIO Bank Power	1.2, 1.5, 1.8, 2.5, 3.3
VDDAUX1	GPIO Pre-Driver Bank Power	2.5, 3.3
VDDAUX2	MSSIO Pre-Driver Bank Power	2.5, 3.3
VDDAUX4	MSSIO Pre-Driver Bank Power	2.5, 3.3

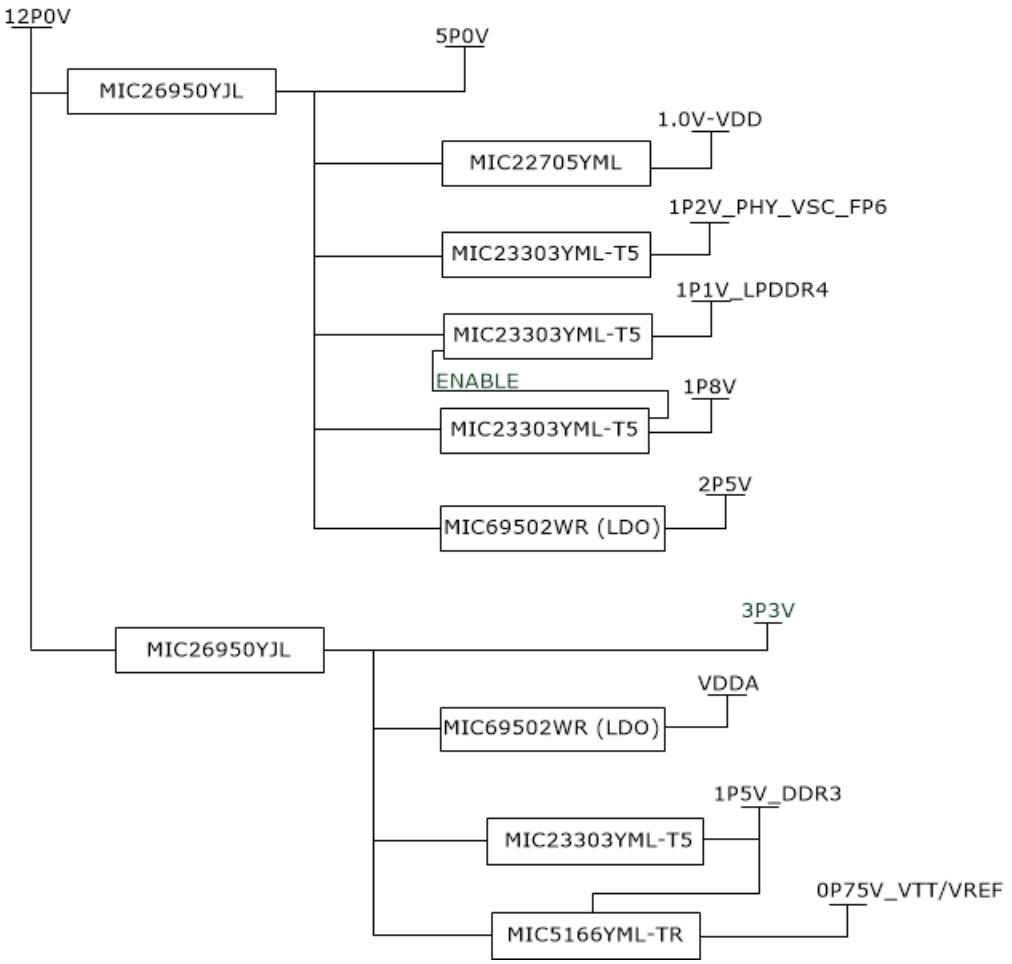
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Table 2-4. I/O Voltage Rails (continued)		
Supply Name	**Description**	**Value (in Voltage)**
VDDAUX7	GPIO Pre-Driver Bank Power	2.5, 3.3
VDDAUX9	GPIO Pre-Driver Bank Power	2.5, 3.3
XCVR_VREF	All SerDes RefClk receiver's voltage reference pin	0.9/1.25

Note: Bank 9 VDDI power pins are connected to Bank 1 VDDI power pins within the package substrate for pin migration compatibility.

The following figure shows voltage rails (12V, 5V, 3.3V, 2.5V, 1.8V, 1.2V, and 1.0V) available on the PolarFire SoC Icicle Kit.

Figure 2-1. Voltage Rails on PolarFire SoC Icicle Kit



The following table lists the power regulators used for PolarFire SoC FPGA Icicle voltage rails.

Table 2-5. Power Regulators

Voltage Rail	Part Number	Description	Current
5 V	MIC26950JL	IC REG BUCK ADJ	12 A
VDD (1 V)	MIC22705YML	IC REG BUCK ADJUSTABLE	7 A
VSC_PHY(1.2 V)	MIC23303YML-T5	IC REG BUCK ADJUSTABLE	3 A
1.1V_LPDDR4	MIC23303YML-T5	IC REG BUCK ADJUSTABLE	3 A
1P8V	MIC23303YML-T5	IC REG BUCK ADJUSTABLE	3 A

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Table 2-5. Power Regulators (continued)

Voltage Rail	Part Number	Description	Current
2P5V	MIC69502WR	IC REG LINEAR POS ADJ	5 A
3P3V	MIC26950JL	IC REG BUCK ADJ	12 A
VDDA	MIC69502WR	IC REG LINEAR POS ADJ	5 A
1P5V_DDR3	MIC23303YML-T5	IC REG BUCK ADJUSTABLE	3 A
VTT	MIC5166YML-TR	IC PWR SUP 3 A HS DDR TERM 10MLF	3 A

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3. Board Components and Operations (Ask a Question)

This section describes the key components of the PolarFire SoC Icicle Kit and provides information about important board operations. For device datasheet, see the PolarFire SoC FPGAs web page.

For more information, see the Board Level Schematics document.

3.1. LDDR4 Memory Interface (Ask a Question)

LPDDR4 is connected to the MSS BANK 6.

- Part number: MT53D512M32D2DS-053 WT:D TR
- Manufacturer: Micron
- Frequency range: 800 MHz
- Memory size: 16 Gb

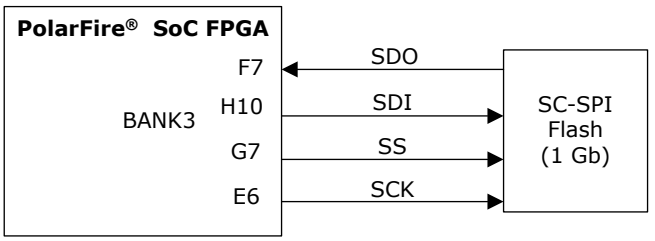
3.2. SPI Serial Flash (Ask a Question)

PolarFire SoC Icicle Kit has one SPI flash 1 Gb. Flash is connected to BANK3 SC-SPI pins to support IAP programming.

- Part number: MT25QL01GBBB8ESF-0SIT
- Manufacturer: Micron
- Flash Type: NOR

The following figure shows the SPI Flash interface of the PolarFire SoC Icicle Kit.

Figure 3-1. SPI Flash Interface



3.3. eMMC and SDIO Interface (Ask a Question)

PolarFire SoC MSS BANK4 has MUXed IOs for SDIO or eMMC interface. PolarFire SoC Icicle Kit uses on board MUX U44 and U29 to select interface between 8 GB eMMC device or SD card connector.

3.3.1. eMMC (Ask a Question)

- Part number: SDINBDG4-8G
- Manufacturer: SanDisk
- eMMC 5.1
- Supports variable clock frequencies of 0-20 MHz, 0-26 MHz (default), 0-52 MHz (high-speed), 0-200 MHz SDR (HS200), and 0-200 MHz DDR (HS400)
- Dual power system: Core voltage (Vcc) 2.7 to 3.3 V, IO (VCCQ) voltage either: 1.7-1.95 V or 2.7-3.6 V

3.3.2. SD Card (Ask a Question)

PolarFire SoC Icicle Kit has one SD card connector.

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- Part number: 10067847-001RLF
- Manufacturer: Amphenol ICC (FCI)
- SD interface is connected using a voltage translator between SD card connector and MUX (eMMC/SD)
- Supported modes are default speed (25 MHz), high speed (50 MHz), UHS-I (SDR12, SDR25, SDR50, SDR14, and DDR50)

3.4. High Speed Transceivers Configuration (Ask a Question)

3.4.1. Transceivers Block Allocations (Ask a Question)

- MPFS250T-FCVG484E has one XCVR block and 4 SERDES LANES available.

3.4.2. PCIx16 Connector (Ask a Question)

XCVR x4 lanes are mapped to PCIe CONN.

On board PCIx16 straddle Mount root port connector is available in PolarFire SoC Icicle Kit.

- Part number: 10025026-10103TLF
- Manufacturer: Amphenol ICC
- 4-TX/RX pairs are connected to SERDES block
- 100 MHz oscillator (DSC2033FI2-F0044) provides reference clock to the connector

3.5. Communication Interfaces (Ask a Question)

3.5.1. Ethernet – SGMII Interface (Ask a Question)

VSC8662 device is a low-power, dual Gigabit Ethernet transceiver (1000BASE-X Gigabit Ethernet Transceiver PHY)

- Part number: VSC8662
- VSC8662 MAC interface dual port signals (Port 0 and Port1) RX/TX is connected on MSS SGMII Bank 5
- VSC8662 MDC and MDIO signals are connected MSS BANK 2

3.5.2. CAN Interface (Ask a Question)

PolarFire SoC Icicle Kit has two CAN interfaces. One interface is from the MSS BANK 2 and another interface is from the GPIO BANK 1.

- Part number: MCP2562FDT-E/SN
- Manufacturer: Microchip

3.5.3. USB OTG (Ask a Question)

USB3340 is a Hi-Speed USB 2.0 Transceiver that provides a physical layer (PHY) solution well-suited for portable electronic devices.

- Part number: USB3340-EZK-TR
- Manufacturer: Microchip
- USB interface uses MSS BANK 2
- 26 MHz on board crystal for reference clock (VXM7-9029-26M0000000)

3.6. Expansion Capabilities (Ask a Question)

The following sections explain the expansion connectors for PolarFire SoC Icicle Kit.

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3.6.1. Raspberry Pi 4 Connector (Ask a Question)

PolarFire SoC Icicle Kit has 40 pin Raspberry pi connector.

- Part number: 61204021621
- Manufacturer: Wurth Electronics
- Raspberry pi signals use GPIO BANK 1 and BANK 9

3.6.2. mikroBUS Connector (Ask a Question)

PolarFire SoC Icicle Kit has 16 pin mikroBUS interface connector.

- UART, SPI, and I^2C signals
- SPI signals use MSS BANK 2
- I^2C, UART, and other GPIO signals use GPIO BANK 1 and BANK 9

3.7. Voltage and Current Monitoring (Ask a Question)

PolarFire SoC Icicle Kit has provision to measure current for four power rails.

- VDD
- VDD25
- VDDA25
- VDDA

Current sensing is done by PAC1934T-I/JQ. The I^2C interface is available on digital values to read back values. Sensor's I^2C interface is connected to the MSS I^2C interface.

3.8. GPIO (Ask a Question)

3.8.1. Switches and LEDs (Ask a Question)

PolarFire SoC Icicle Kit is equipped with four tact switches and four LED indicators.

- Switches and LEDs are connected to HSIO BANK 0

3.8.2. LEDs (Ask a Question)

LED's to indicate:

- Power
- User defined LEDs (quantity – 4)

3.9. User Interface (Ask a Question)

The PolarFire SoC Icicle Kit has four user defined LEDs and four push-button switches.

3.9.1. USB to UART Interface (Ask a Question)

CP2108 is a USB to quad UART bridge controller to support 4 UART interface on board. UART IOs are connected to the Fabric IOs (Bank1) of PolarFire SoC.

- Part number: CP2108-B02-GM
- Manufacturer: Silicon Labs
- UART interface uses GPIO BANK 1 and BANK 9

Note:
The Silicon Labs CP2108 drivers are needed to see the COM ports through the J11 connector. The drivers can be downloaded from the following location:

www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers

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3.10. Mux for JTAG Selection (Ask a Question)

Multiplexer U22 is used for JTAG selection for External Flash Pro header and On board Programmer .

- Part number: 74CBTLV3257BQ,115
- Manufacturer: NXP

Table 3-1. Mux for JTAG Selection

Jumper (J9)	JTAG Selection
Open	External Flash Pro header
Close	On-board Programmer

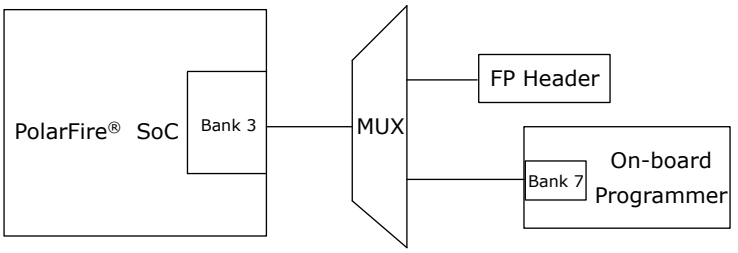
3.11. Programming Scheme (Ask a Question)

PolarFire SoC silicon is programmed in two ways:

- Using FlashPro header connected to BANK3 of PolarFire SoC
- On-board programmer (BANK 7)

The following is the block diagram for programming scheme of PolarFire SoC.

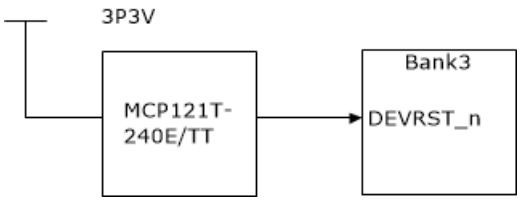
Figure 3-2. PolarFire SoC Programming Scheme Block Diagram



3.12. System Reset (Ask a Question)

DEVRST_N is an input-only reset pad that allows a full reset of the chip to be asserted at any time. The following figure shows a sample reset circuit that uses a Microchip MCP121T-240E/TT device.

Figure 3-3. Reset Circuit



3.13. 50 MHz Oscillator (Ask a Question)

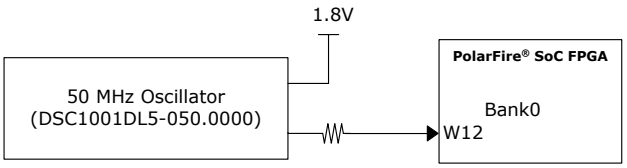
A 50 MHz clock oscillator with an accuracy of ±10 ppm is available on the board. This clock oscillator is connected to the FPGA fabric to provide a system reference clock.

The pin number of the DSC1001DL5-050.0000 50 MHz oscillator is W12, and the pin name is HSIO92PB0/CLKIN_N_2/CCC_NW_CLKIN_N_2/CCC_NW_PLL1_OUT0.

The following figure shows the 50 MHz clock oscillator interface.

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Figure 3-4. 50 MHz Clock Oscillator (DSC1001DL5-050.0000)



For more information, see the Board-Level Schematics document (provided separately).

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4. Pin List (Ask a Question)

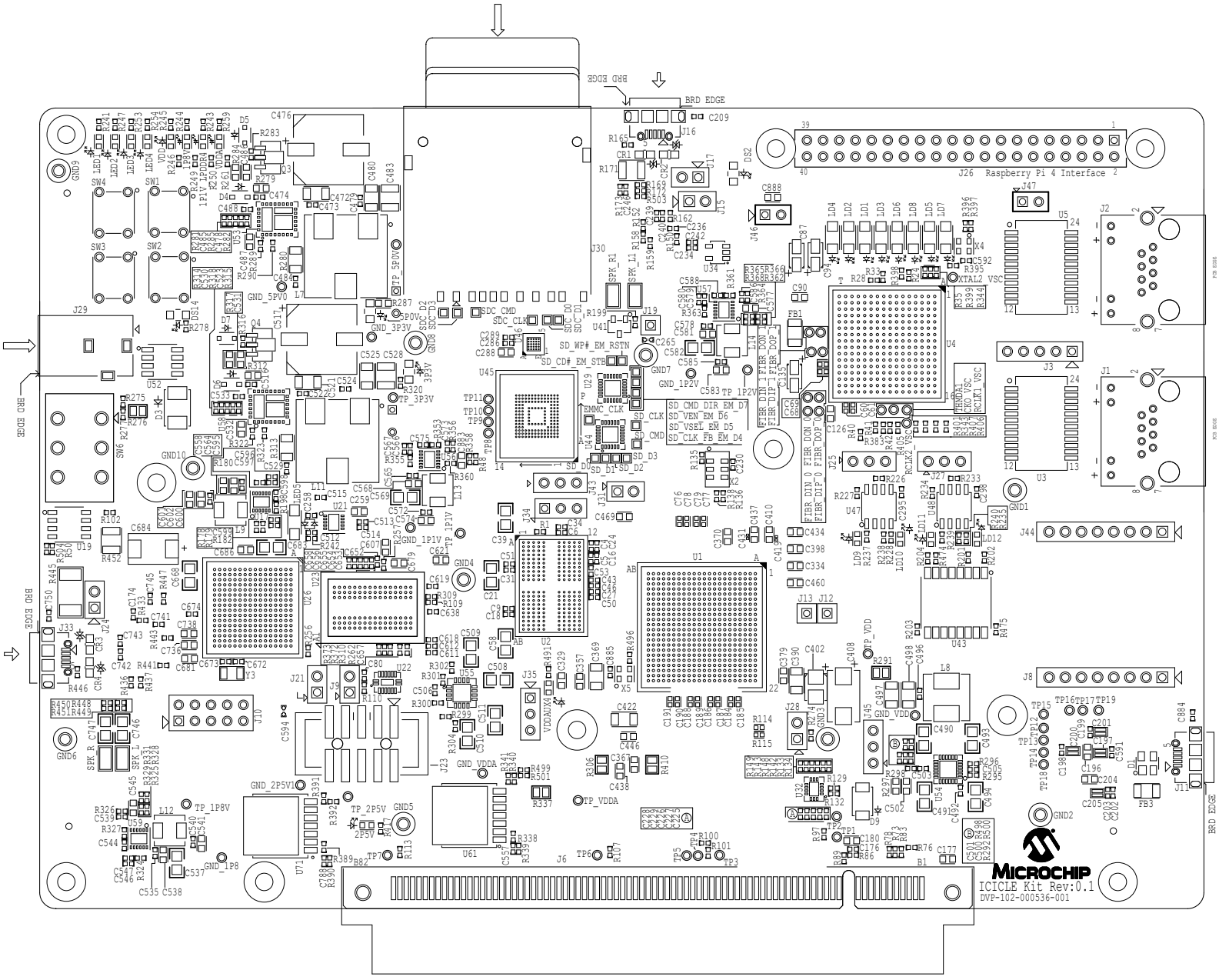
For more information about all package pins, see MPFS025T/MPFS025TS-FCVG484 Package Pin Assignment Table.

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5. Board Component Placement (Ask a Question)

The following figure shows the placement of various components on the PolarFire SoC Icicle Kit silkscreen.

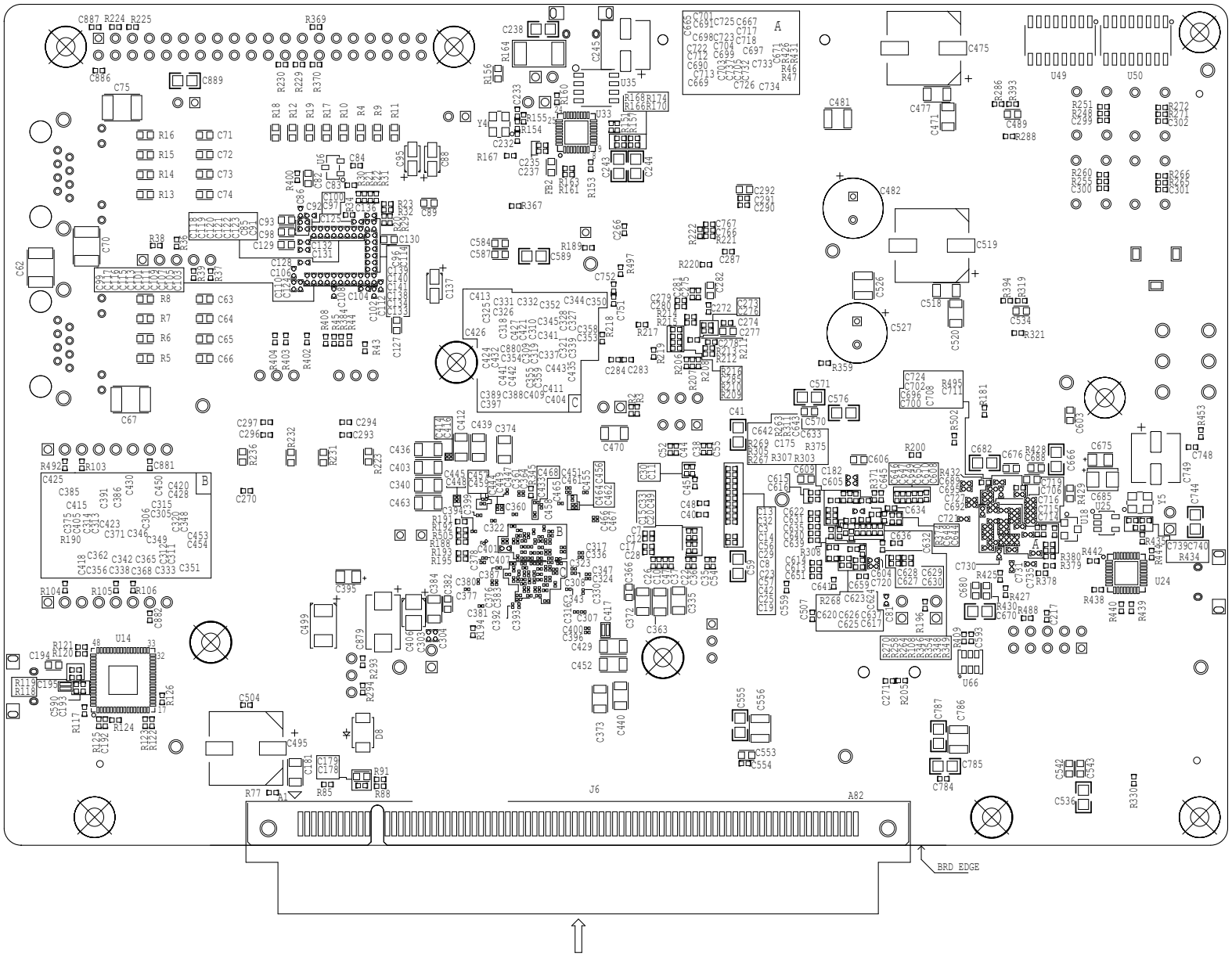
Figure 5-1. Silkscreen Top View



The following figure shows the bottom view of the PolarFire SoC Icicle Kit silkscreen.

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Figure 5-2. Silkscreen Bottom View



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6. Demo Design (Ask a Question)

For the Icicle kit reference design, see the documentation provided on GitHub.

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7. Appendix: Programming PolarFire SoC FPGA Using the On-Board Programmer (Ask a Question)

The PolarFire SoC Icicle Kit includes an on-board programmer. An external programmer hardware is, therefore, not required to program the PolarFire SoC device. The device can be programmed using the FlashPro software installed on the host PC.

Follow these steps to program an on-board PolarFire SoC device using the on-board programmer.

Notes: The programming file will be available in a future release.

1. Connect the power supply cable to the **J23** connector on the board.
2. Close Jumper **J9** for mux U22.
3. Power on the board using the **SW6** slide switch.
4. When the board is successfully set up, the power LEDs start glowing.
5. Download FlashPro Express.
6. On the host PC, start the **FlashPro Express** software.
7. Click **New Project** to create a new project.
8. In the **New Project** window, do the following, and click **OK**.
   - Enter a project name.
   - Select **Single device** as the programming mode
9. Click **Configure Device**.
10. Click **Program** to program the device.
11. From the **View Programmer** pane, select the on-board FlashPro6 programmer.
12. Click **Browse**, and select the .stp file from the **Load Programming File** window.

The **Programmer List** window in the FlashPro Express software shows the programmer name, programmer type, port, programmer status, and information about whether the programmer is enabled.

When the device is programmed successfully, a Run Program PASSED status is displayed.

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8. Revision History (Ask a Question)

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

Revision	Date	Description
E	06/2026	The following is a summary of the changes made in this revision: • Updated the FPGA device part number to MPFS250T-FCVG484E from MPFS250T-FCVG484EES throughout the document.
D	12/2024	The following is a summary of the changes made in this revision. • Added part number of the on-board 50 MHz and 125 MHz oscillator in Table 1-3. • Added part number of the 100 MHz oscillator. See PCIx16 Connector. • Added part number of the 26 MHz oscillator. See USB OTG. • Added part number of the on-board 50 MHz oscillator in Figure 3-4.
C	11/2024	The following is a summary of the changes made in this revision. • Updated the GitHub link in Demo Design.
B	05/2021	Updated USB to UART Interface section with a note.
A	01/2021	Following is a list of changes made in this release: • Converted this document to Microchip template. Document number was changed from 50200882 to DS60001679A. • Information about Form Factor has been updated in this revision.
2.0	—	The following is a summary of the changes made in this revision. • Updated Table 10. • Updated the Appendix: Programming PolarFire SoC FPGA Using the On-Board Programmer.
1.0	—	This is the first publication of this document.

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