PolarFire SoC Discovery Kit Quickstart Guide

Introduction (Ask a Question)

This Quick Start Guide outlines the steps to download drivers and software, connect, power up, and communicate with the Discovery Kit board. It includes a free DSP FIR Filter demonstration, allowing users to immediately explore an application on Discovery kit.

Discovery Kit Contents (Ask a Question)

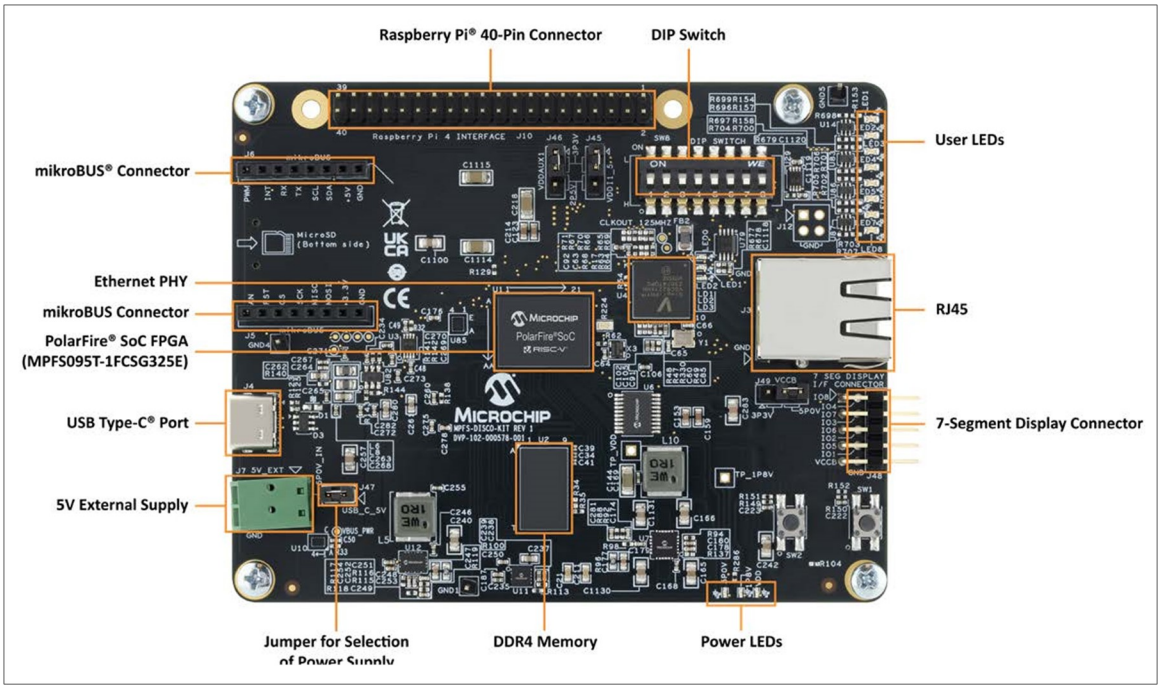
The following table lists the contents of the Discovery Kit.

Quantity	Description
1	PolarFire® SoC Discovery Kit Board with MPFS095T-1FCSG325E
1	USB 2.0 Cable, USB-C Male to USB-C Male, 3.28ft (1.00m), Shielded
1	Quickstart card

Board Component Locations (Ask a Question)

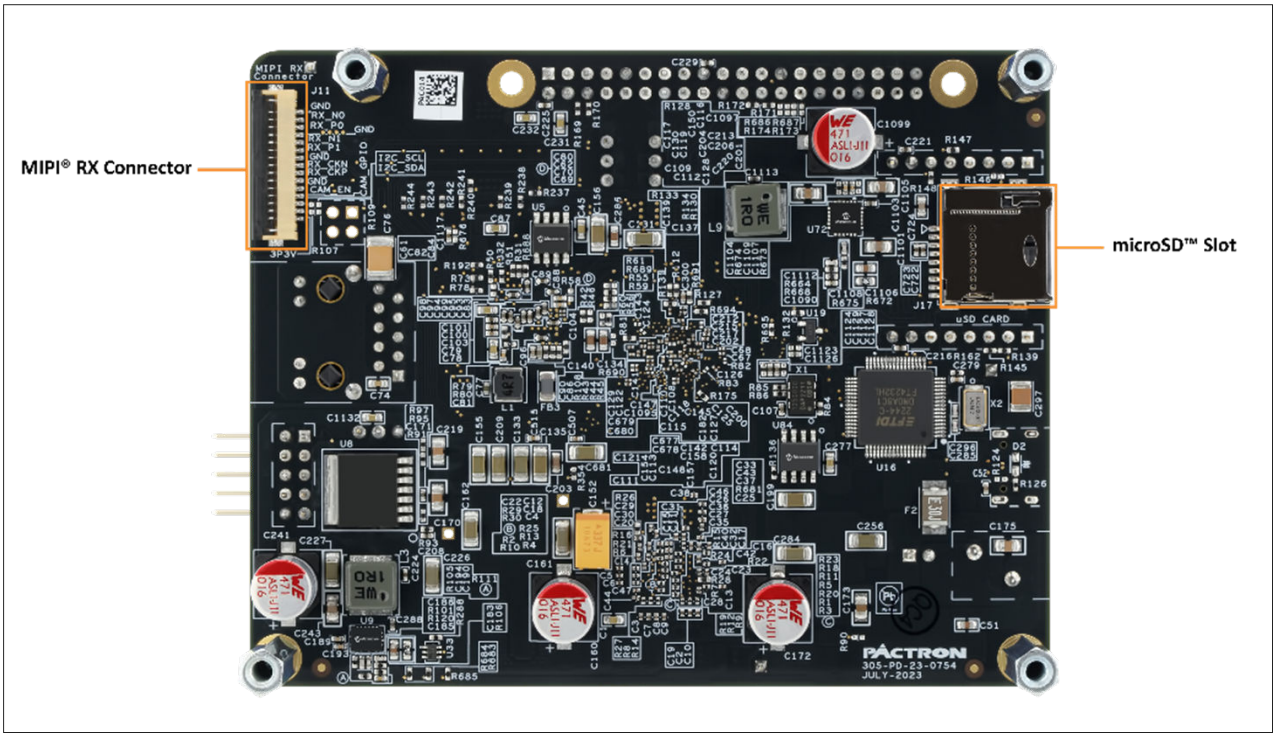
The following figure highlights the top-view of the Discovery Kit board.

Figure 1. Top-view of the Discovery Kit Board



The following figure highlights the bottom-view of the Discovery Kit board.

Figure 2. Bottom-View of the Discovery Kit Board.



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1. Getting Started with the DSP FIR Filter Demonstration (Ask a Question)

Note: The DSP FIR Filter Demonstration is available only on host PCs running Windows

You do not need Libero SoC Design Suite to use the DSP FIR Filter demonstration. To run the demonstration without downloading the Libero software, follow these steps:

1. Ensure Correct Jumper Settings for the Demonstration

> **⚠ CAUTION** Follow all electrostatic discharge (ESD) precautions when handling the evaluation board to avoid damaging sensitive electronic components.

Set up the kit by adjusting the jumper settings on the board as shown in the following table.

Table 1-1. Correct Jumper Settings for DSP FIR Filter Demonstration using USB Type-C Port

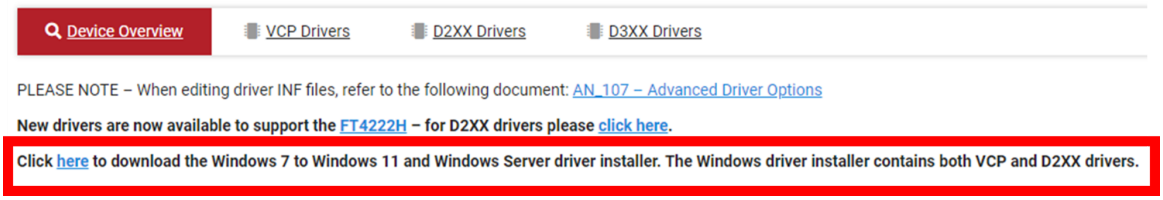
Jumper	Setting
J45	1 and 2 closed
J46	1 and 2 closed
J47	1 and 2 closed
J49	2 and 3 closed

2. Download Drivers and FlashPro® Software to the Host PC

   To manage communication between the board and the host PC, you need **FTDI Drivers** and the **Microchip FlashPro Express** software. The Discovery Kit board uses an FTDI chip to manage USB-to-UART communications

   a. To download and install FTDI Drivers to the Host PC, go to **FTDIChip.com/Drivers**. Follow the installation instructions as shown in the below figure.

   Figure 1-1. FTDI Website Link for Drivers -Required for DSP FIR Filter Demo



   b. Download and install the Microchip FlashPro Express to the host PC.

3. Connect the Supplied USB Type-C Cable to the Board and Host PC

   The supplied cable powers the board and enables communication between the board and the host PC for FPGA programming and demonstration use. For optimal performance and to avoid compatibility issues, power the kit using a USB port directly from a laptop or PC. The kit has not been tested with USB ports from docking stations, so using a USB port on a laptop or PC is the most reliable option.

4. Restart the Host PC and Verify Drivers Initialization

   To ensure the drivers are correctly installed and that the connection between the host PC and the board is functioning, follow these steps:

   a. To open the Windows **Device Manager**, right-click **Start** or press Windows key + X, then select **Device Manager**.

   b. To view the available ports, click **Ports (COM & LPT)**.

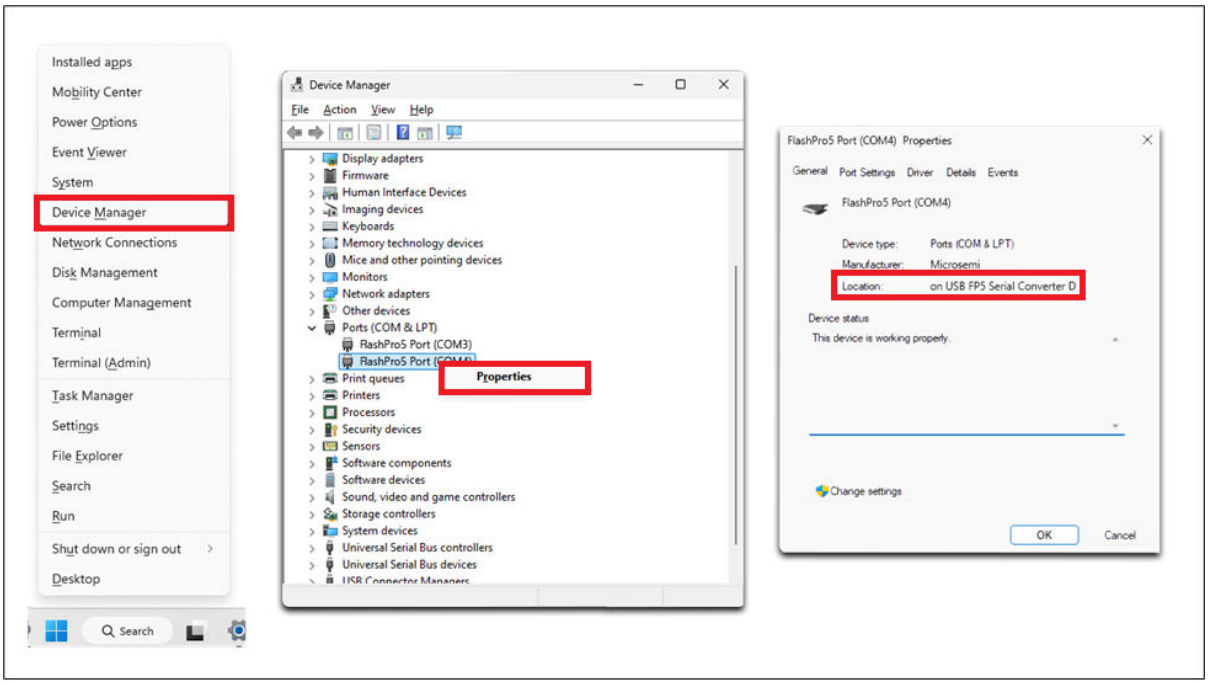
   c. Right-click each port and select **Properties**.

d. If one of the port properties shows "**Location: on USB FP5 Serial Converter D**," the drivers are installed, and the connection is working correctly.

Important: If none of the port properties display the location above, please repeat Steps 2 and 3.

The following figure shows the steps which are explained in the preceding procedure:

Figure 1-2. Process of Verifying Drivers Installed and Connection is Active and Working



Note: The COM port number is system specific and may vary for each user compared to the number shown in the preceding figure.

5. Download and Install the Documentation and Demonstration Files to the Host PC

   All required programming files, scripts, the Windows-based Graphical User Interface (GUI) tool, and the Application Note (PDF) are available to run the PolarFire SoC FPGA DSP FIR Filter Demonstration.

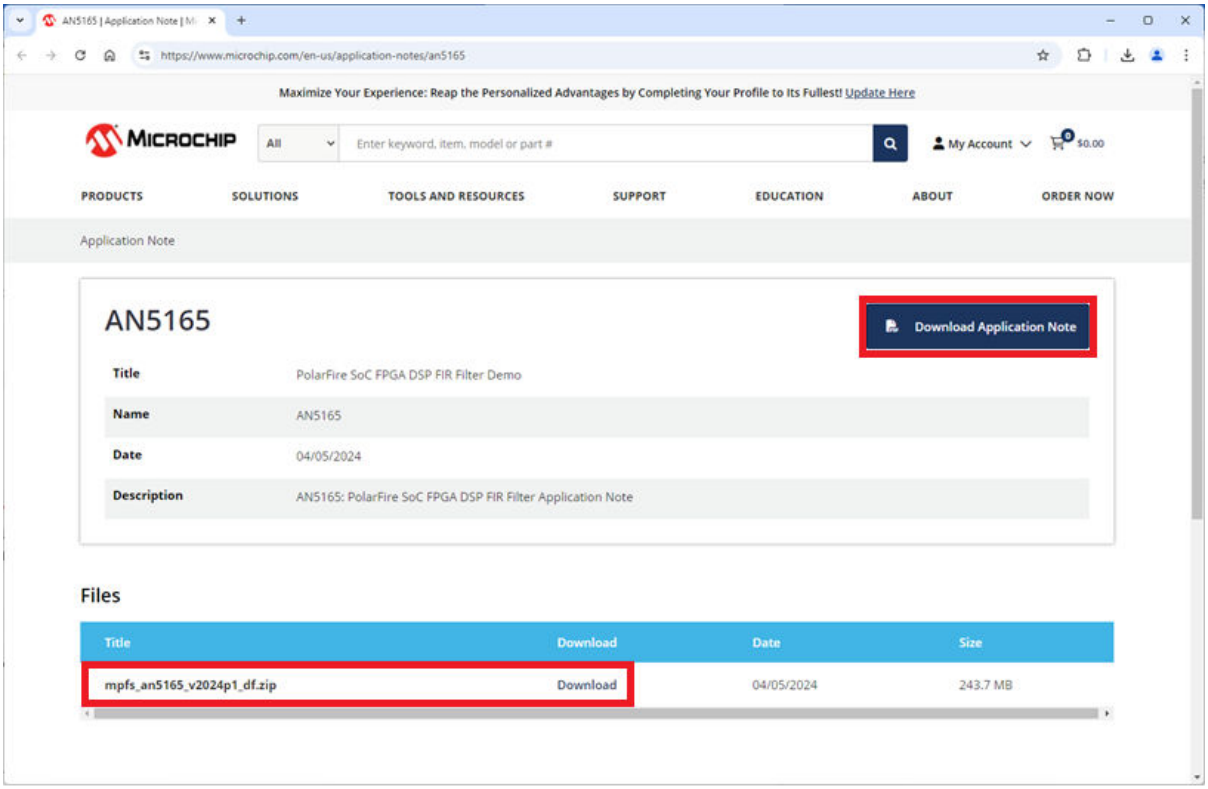
   a. Go to AN5165 webpage.

   b. For complete instructions on using the demo, including installing and running the GUI tool, click **Download Application Note.**

   c. To download and install the `.zip` file containing the GUI, scripts, and programming jobs for the demonstration, click **Download.**

   The following figure shows the steps which are explained in the preceding procedure:

Figure 1-3. Application Note and Demo ZIP file



2. YouTube Video — Using the Discovery Kit and DSP FIR Filter Demo (Ask a Question)

This video provides a comprehensive overview of how to get started with the Discovery Kit and demonstrates its applications with the DSP FIR Filter Demo.

To watch this video, click this image.

3. Linux® Considerations (Ask a Question)

A GitHub repository is available to generate a reference design for the PolarFire SoC Discovery Kit. This base reference design differs in functionality from the DSP FIR Filter demo design described earlier.

To boot Linux, program the Discovery Kit with the reference design available in the Discovery Kit Reference Design Repository.

FlashPro Express files for programming without using Libero are available in the Releases section.

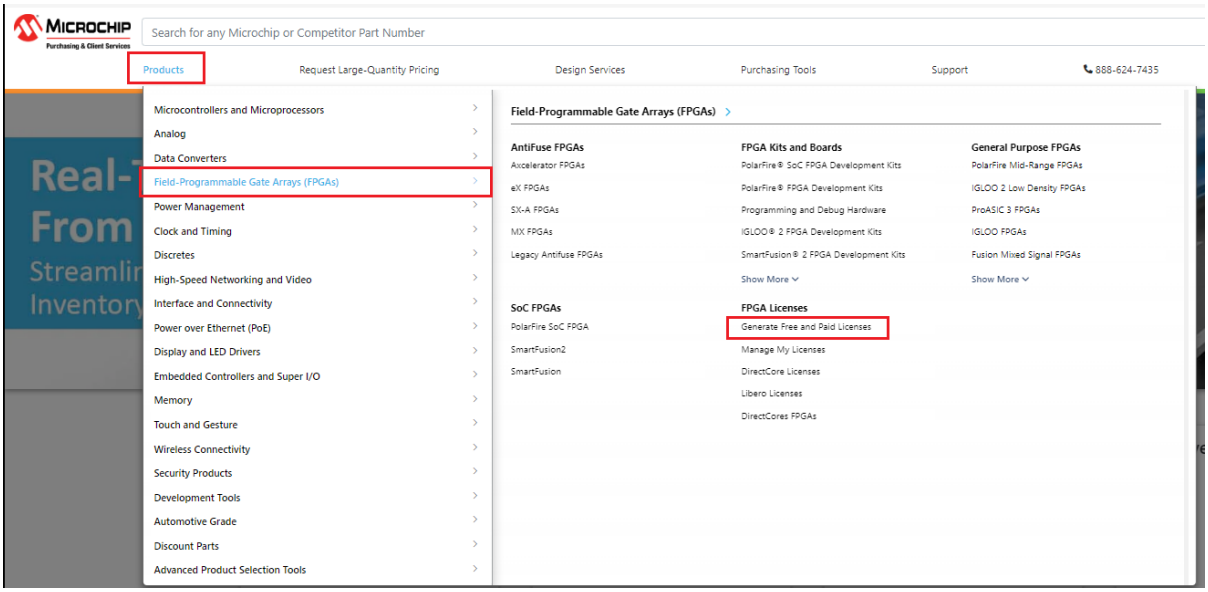
4. Libero® SoC Design Suite—Free Silver License (Ask a Question)

To access free silver license, perform the following steps:

1. Go to Microchip Direct.
2. Register or Sign in to MicroChip Direct.
3. In the **Products** list, click **Field-Programmable Gate Arrays (FPGAs)**.
4. Under **FPGA Licenses**, click **Generate Free and Paid Licenses**.

   The following figure shows the steps which are explained in the preceding procedure:

Figure 4-1. Generate Free and Paid Licenses



5. Then, click **Request Free License**.

Figure 4-2. Request Free License

5. Developing New Projects with the Discovery Kit (Ask a Question)

The PolarFire SoC FPGA offers a programmable logic fabric and an embedded quad-core RISC-V microprocessor subsystem capable of running combination of Linux, RTOS, or BareMetal in Symmetric Multiprocessing (SMP) and Asymmetric Multiprocessing modes (AMP).

Requirements:

- **SD Card** (for Linux or AMP Operation): We recommend using a SanDisk® brand SD card.
- **SoftConsole**: SoftConsole is a free, open-source based software development environment for Windows and GNU/Linux. It supports rapid development of bare-metal and RTOS-based C/C++ software and provides development and debugging support for all Microchip SoC FPGAs and 32-bit soft IP CPUs.
- **Libero SoC Design Suite v2024.1**: Libero SoC Design Suite provides an integrated hardware tool suite that includes RTL entry through programming, a rich IP library, complete reference designs, and development kits.

5.1. Connecting to MSS UART Interfaces from Linux Hosts (Ask a Question)

When using the Discovery Kit with a Linux host PC, add udev rules to enable Linux to detect the FTDI USB-to-UART bridge. Without these settings, COM ports may not appear on the Linux host.

For more information about udev rules, see MPFS Discovery Kit User Guide under section Connecting to MSS UART interfaces from Linux hosts.

6. References (Ask a Question)

The following table lists the documents you can refer for further information:

Table 6-1. Documentation Resources

Title	Link
Discovery Kit Product Page	For the Discovery Kit product page, see: **www.Microchip.com/DiscoveryKit**
Application Note	For more information on how to implement basic PolarFire® SoC FPGA designs leveraging the Libero® SoC, see: **AN5282: PolarFire SoC Design Flow Application Note**
Hardware Design & Specifications	For a hardware user guide for the Discovery Kit, see: **PolarFire SoC FPGA Discovery Kit Hardware User Guide**
	For Discovery Kit schematics, see: **PolarFire SoC Discovery Kit Schematics**
	For the board design files for the Discovery Kit, see: **PolarFire SoC Discovery Kit Board File**
Embedded Software UG	A user guide on how to use the Discovery Kit for embedded software development, see: **Discovery Kit Embedded Software User Guide**
RISC-V Microprocessor Sub-System	For information on the processor subsystem in PolarFire SoC, see: **PolarFire SoC MSS Technical Reference Manual**
Microchip Technology FPGA & SOC Product Pages	For information on Microchip FPGAs, see: **FPGA Project Pages**
Libero SoC Design Suite Software	For information on Microchip FPGA design tools, see: **www.microchip.com/libero**
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Mi-V RISC-V Ecosystem	For information on the Microchip RISC-V partner ecosystem, see: **www.microchip.com/mi-v**
Discovery Kit Reference Design Generation Tcl Scripts	For Tcl scripts to generate sample designs for the Discovery Kit, see: **https://github.com/polarfire-soc/polarfire-soc-discovery-kit-reference-design/releases/tag/2024.04**
Embedded Software – Bare Metal Development	For bare metal embedded software drivers and examples for the Discovery Kit, see: **www.github.com/polarfire-soc/polarfire-soc-bare-metal-examples**
PolarFire SoC Yocto BSP	For a Yocto Linux build system supporting the Discovery Kit, see: **https://github.com/polarfire-soc/meta-polarfire-soc-yocto-bsp**
Knowledge Base Articles	For PolarFire SoC Knowledge based articles, see: **https://microchip.my.site.com/s/article/KB-of-PFSoC-Knowledge-Base-articles**

7. Microchip Technology Support (Ask a Question)

This table provides a comprehensive list of support resources from Microchip Technology.

Table 7-1. Support and Training Resources

Support	URL/Contact	Description
Technical Support	Microchip.com/Support	Support, forums, wiki, training, code examples, and more
Technical Support Line	**(888) 624-7435**	Press **2** for technical support
GitHub Repository	GitHub.com/PolarFire-SOC	Documentation, reference designs, software, and more
Microchip FPGAs & SOCs	Microchip.com/FPGA	FPGAs, SoCs, design software, development hardware, and IP
My Microchip	Microchip.com/MyMicrochip	Your personal Microchip portal
Microchip Direct	MicrochipDirect.com	Buy direct from Microchip
Product Alerts	Microchip.com/PCN	Product change notification service
Microchip University	Microchip.com/MU	Comprehensive training curses

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Contact Customer Service for non-technical product support, such as product pricing, product upgrades, update information, order status, and authorization.

- From North America, call **800.262.1060**
- From the rest of the world, call **650.318.4460**
- Fax, from anywhere in the world, **650.318.8044**

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- Technical Support

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