

BytePipe x9002

HDK Quick Start Guide



OVERVIEW

The BytePipe SDR Development Kit consists of a Hardware Development Kit (HDK) main board combined with a Software Defined Radio (SDR) System on a Module (SOM) and supporting cables, power supply, and software to enable testing and development with the NextGen RF BytePipe SOM.

The SOM Development Kit can be used as an evaluation tool and prototyping platform to aid in integration of the SOM into a full-scale product, or as a starting point to explore custom development of an SDR transceiver.

HIGHLIGHTS

FEATURES

- USB 2.0/3.0 Host/Device/OTG Connector
- 10/100/1000 Ethernet Connector
- Mini DisplayPort Connector
- SATA Interface Connector
- JTAG/UART Interface
- RF Device Clock & MCS
- Micro-SD Card Slot
- PMOD Connectors
- DC Power Regulators
- Square Form Factor - 4.25" x 4.25" (PCB Only)

A PRODUCT OF



TABLE OF CONTENTS

OVERVIEW0

TABLE OF FIGURES.....2

Kit Contents – HDK Only3

Kit Contents – HDK + SOM.....4

SOM Mounting Hardware5

HDK Overview6

ESD Warning.....7

SOM Heatsink and Fan7

SOM Installation8

HDK Setup10

Additional Information13

Distributor Links13

Document Revision History13

TABLE OF FIGURES

Figure 1: Developer Kit Contents – HDK Only	3
Figure 2: Developer Kit Contents – HDK + SOM	4
Figure 3: SOM Mounting Hardware Installed	5
Figure 4: SOM Mounting Hardware Removed	5
Figure 5: HDK Overview.....	6
Figure 6: SOM Heatsink and Fan Installation.....	7
Figure 7: SMPM RF Adapter Placement.....	8
Figure 8: SOM Installation on HDK	9
Figure 9: Keyed Fan Header	9
Figure 10: Keyed Fan Header Pinout	9
Figure 11: Power Switch - OFF.....	10
Figure 12: Micro-SD Card Installation.....	10
Figure 13: RF Test Equipment Connections	11
Figure 14: Serial Connection.....	11
Figure 15: Power Supply.....	11
Figure 16: Power Switch – ON	12
Figure 17: Serial Command Line Interface (CLI).....	12

Kit Contents – HDK Only

The HDK can be purchased with or without a SOM. If purchased without a SOM, the kit will arrive with everything needed to install a SOM, but the SOM will need to be properly installed on the HDK prior to use. Instructions for installation are included later in this document.

- Developer Kit Main Board
- 6 – SOM RF Interconnects
- SOM Heatsink and Fan
- Power Supply
- USB Cables
- Ethernet Cable
- Micro-SD Card (Blank)
- 6 Hours NextGen RF Engineering Support



Figure 1: Developer Kit Contents – HDK Only

Kit Contents – HDK + SOM

The HDK can be purchased with or without a SOM. If purchased with a SOM, the kit will arrive with the SOM preinstalled and is ready to be used right out of the box.

- Developer Kit Main Board
- BytePipe SDR SOM
- 6 – SOM RF Interconnects
- SOM Heatsink and Fan
- Power Supply
- USB Cables
- Ethernet Cable
- Micro-SD Card with Pre-Installed Software
- 6 Hours NextGen RF Engineering Support
- SOM Mounting Hardware



Figure 2: Developer Kit Contents – HDK + SOM

SOM Mounting Hardware

The HDK/SOM combo kit includes spacers and screws securing the SOM on the HDK. These are to ensure the SOM does not become disengaged from the HDK and damaged during shipping. This hardware is not required for operation and can be left in place or discarded.

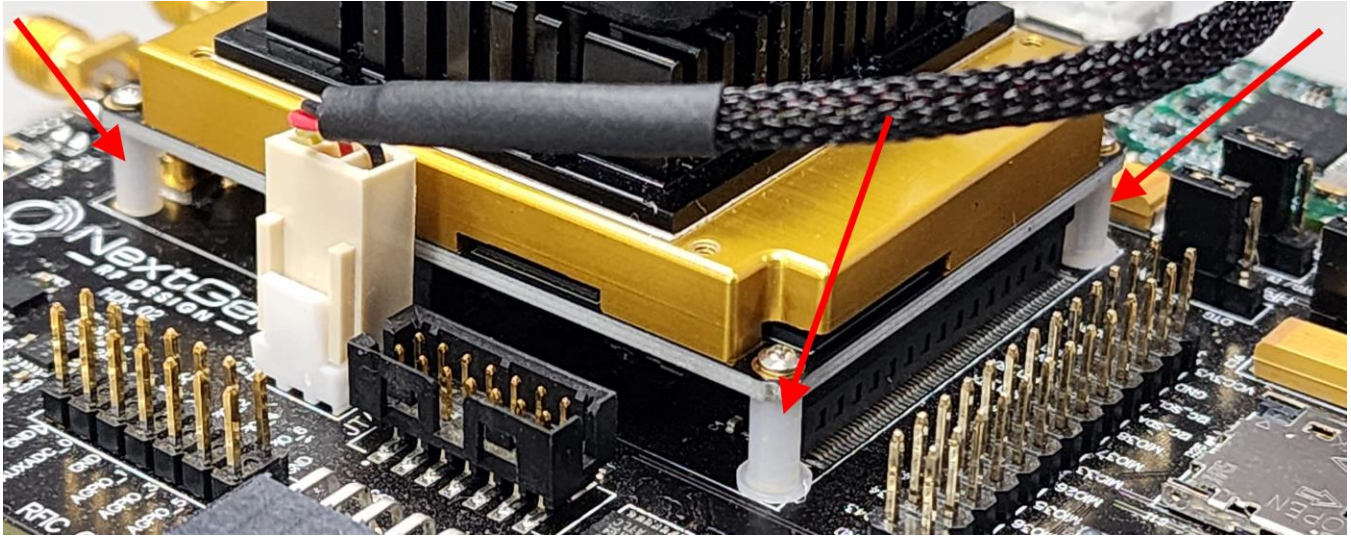


Figure 3: SOM Mounting Hardware Installed

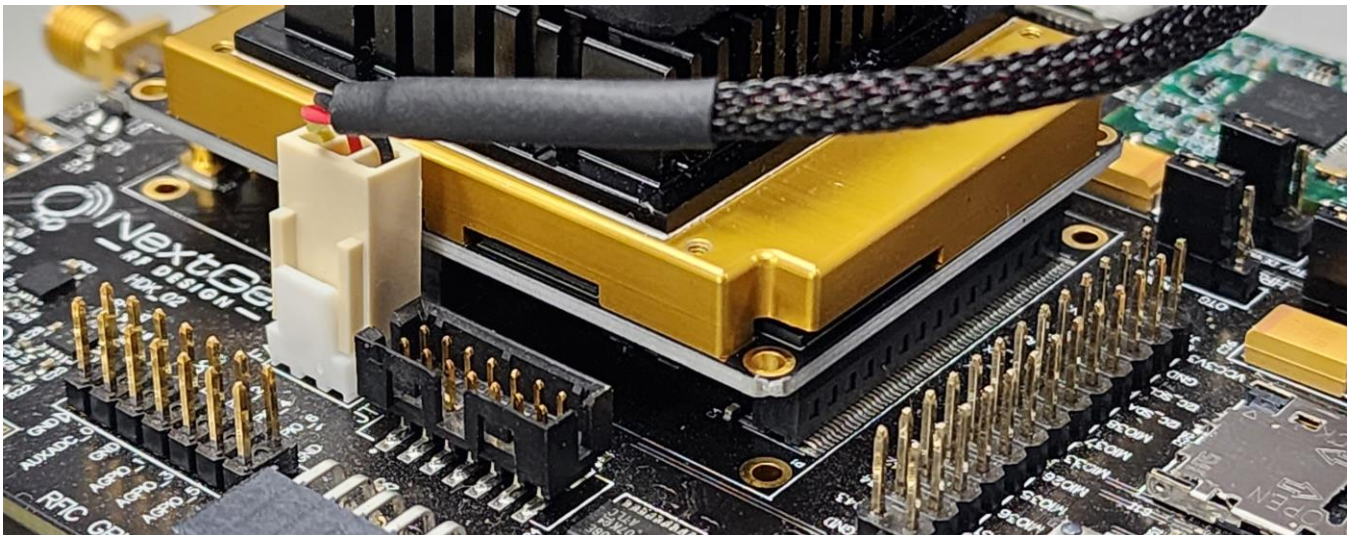


Figure 4: SOM Mounting Hardware Removed

HDK Overview

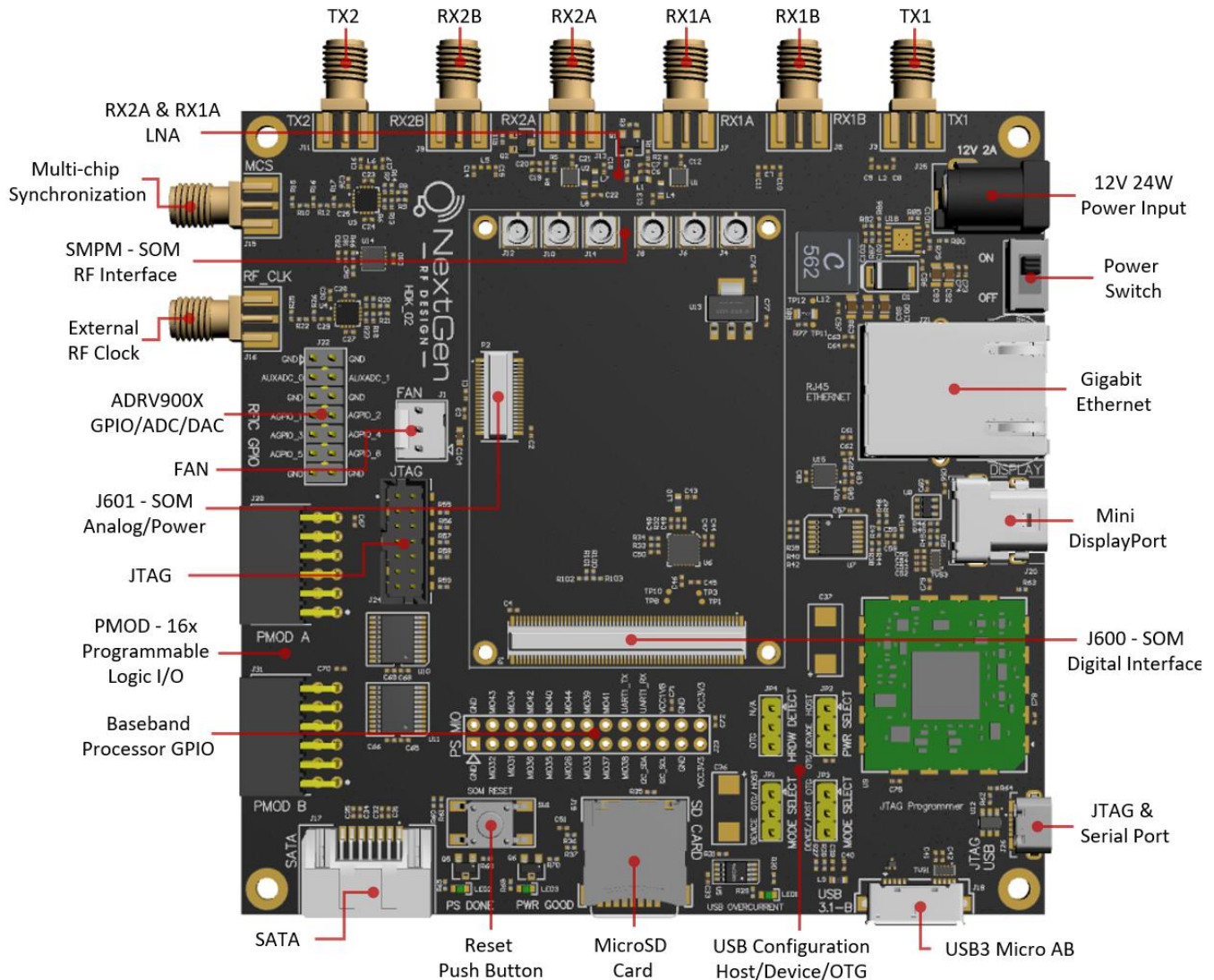


Figure 5: HDK Overview

ESD Warning



Observe precautions for handling electrostatic sensitive devices.

SOM Heatsink and Fan

If the SOM was purchased with the HDK, it will come with a pre-installed heatsink and fan. If purchased separately, the heatsink and fan need to be installed by following the steps below.

CAUTION: Do not operate the SOM without adequate thermal dissipation as damage can occur.

1. Remove any labels from the gold colored shield of the SOM and ensure the surface is clean.
2. Remove the blue plastic from the bottom of the heatsink to expose the adhesive thermal tape.
3. Align the heatsink on the SOM shield such that it is centered in both directions and the fan wire faces the direction shown below.

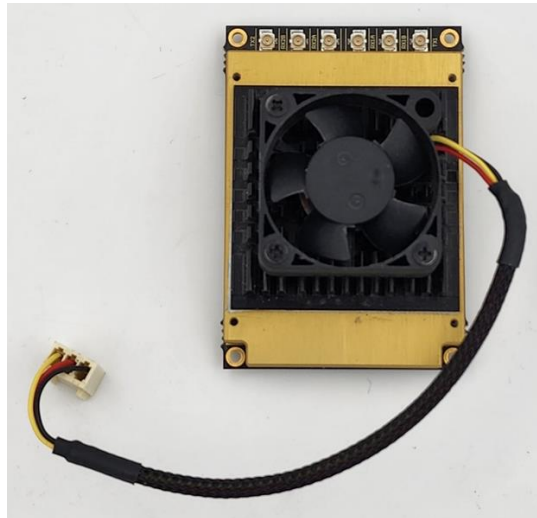


Figure 6: SOM Heatsink and Fan Installation

4. Press the heatsink and shield together firmly for a few seconds to ensure proper adhesion.

SOM Installation

The HDK/SOM interconnect has two board-to-board connectors and six RF connectors. Care must be taken to ensure they are properly aligned before applying the force necessary to fully engage the connections.

If using the U.FL connectors on the SOM, do not install the SMPM adapters – skip to step 3.

1. Inspect the SMPM adapters to ensure they are not damaged.
2. Install the SMPM adapters in each of the six SMPM connectors of the HDK by aligning them vertically and pressing down.

Note: If tools are used to install the adapters, use extreme caution as the adapters can be easily damaged.

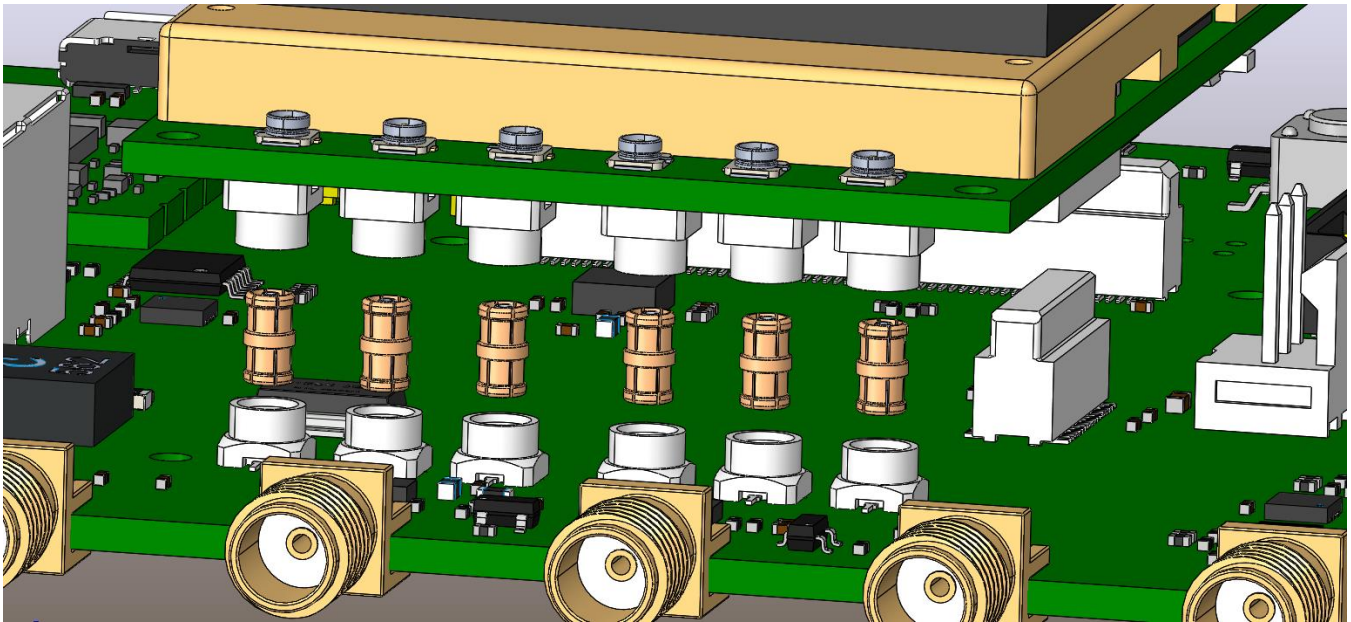


Figure 7: SMPM RF Adapter Placement

- Place the SOM on the HDK so that the six RF connectors and two board-to-board connectors are aligned.

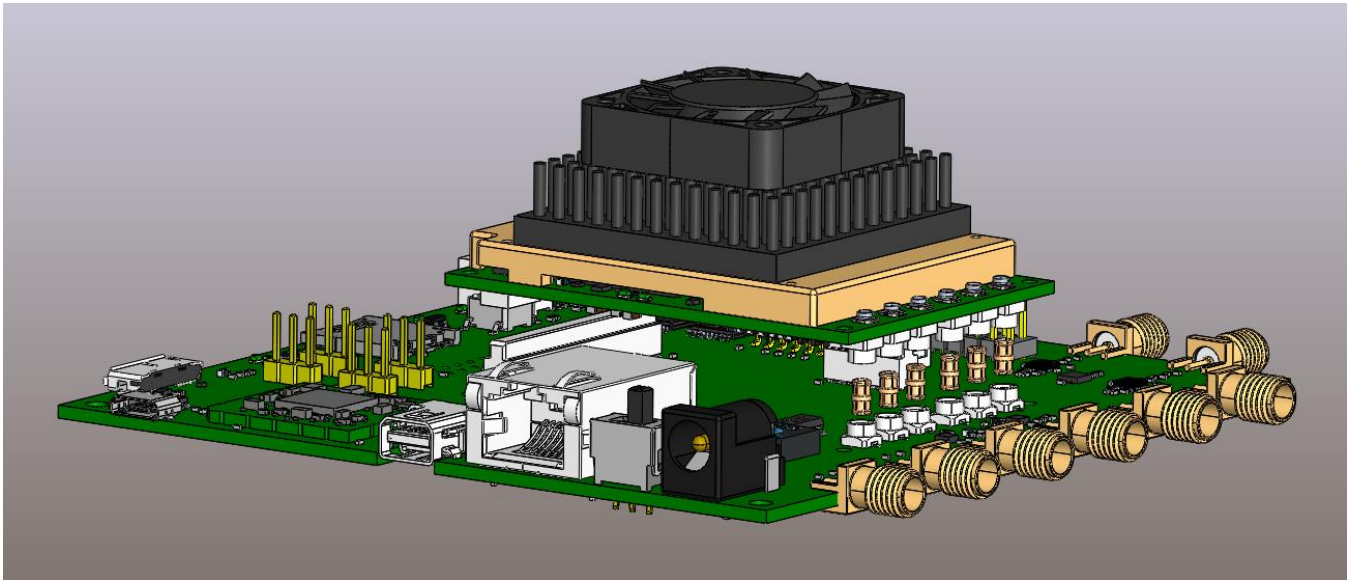


Figure 8: SOM Installation on HDK

- Press the SOM firmly until all connections are fully seated.
- Plug in the fan power connector to J1 of the HDK. This connector is keyed to ensure the proper polarity to the included fan. If using a different fan, ensure the pinout matches using the detail below.

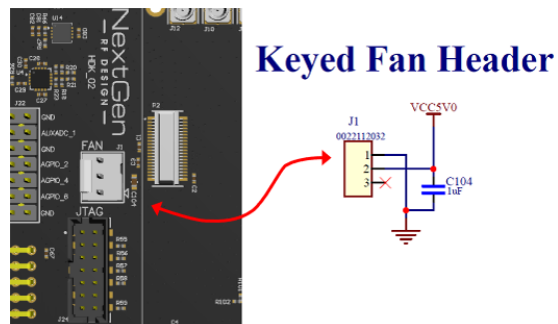


Figure 9: Keyed Fan Header

Signal	J1 Pin	Description
GND	1	Ground
VCC5V0	2	Fan Supply
	NC	No Connect

Figure 10: Keyed Fan Header Pinout

HDK Setup

The HDK comes with a micro-SD card, a power supply, and a USB cable for serial communication. To get started using the HDK, follow the steps below.

1. Ensure the HDK power switch is in the “OFF” position.



Figure 11: Power Switch - OFF

2. The HDK without SOM comes with a blank micro-SD card so software will need to be downloaded and installed. The HDK+SOM comes with a micro-SD card containing a recent version of RFLAN, but it is recommended that this be checked to ensure it is the latest release. The latest software can be found on the NextGen RF Design GitHub here:

https://github.com/NextGenRF-Design-Inc/bytepipe_sdk/releases

Detailed instructions on preparing the micro-SD card can be found here:

https://github.com/NextGenRF-Design-Inc/bytepipe_sdk/blob/main/docs/sd_card/README.md

Be sure to download the software version that matches the SOM logic size and processing system (BP-2CG or BP-3CG) or the SOM will not boot.

3. Ensure the micro-SD card is installed in the micro-SD card holder and that the holder is closed in the “LOCK” position. The holder is a flip-type, so it is opened by sliding the metal cover out, then lifting up. The micro-SD card slides into the open metal cover. The holder is closed by setting it down and sliding the metal cover and micro-SD card back in.

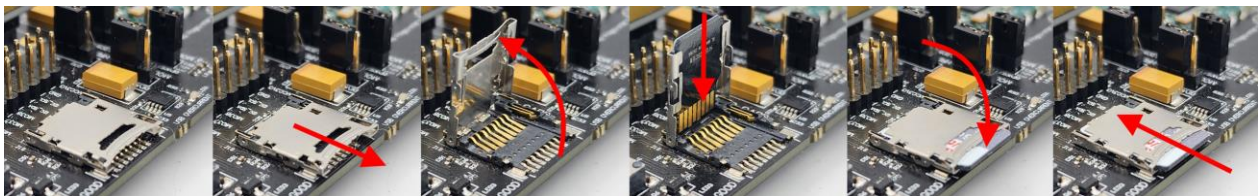


Figure 12: Micro-SD Card Installation

4. Connect desired RF test equipment to SMA connectors (or directly to the U.FL connectors if not using the SMPM adapters).

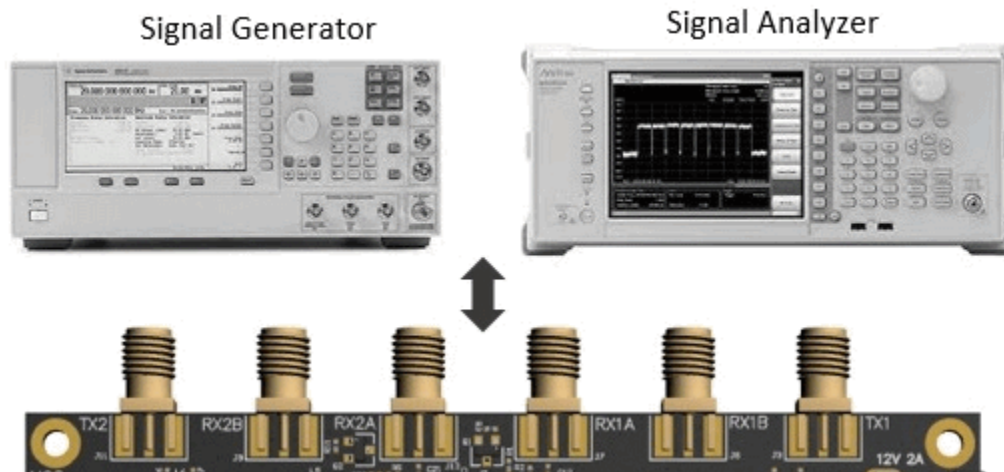


Figure 13: RF Test Equipment Connections

5. Connect a micro-B USB 2.0 cable between the JTAG/USB port of the HDK and a PC or laptop.



Figure 14: Serial Connection

6. Plug in the AC/DC power supply included in the kit, and plug the barrel jack into the HDK.

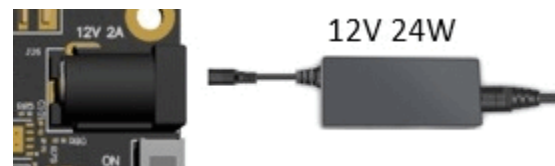


Figure 15: Power Supply

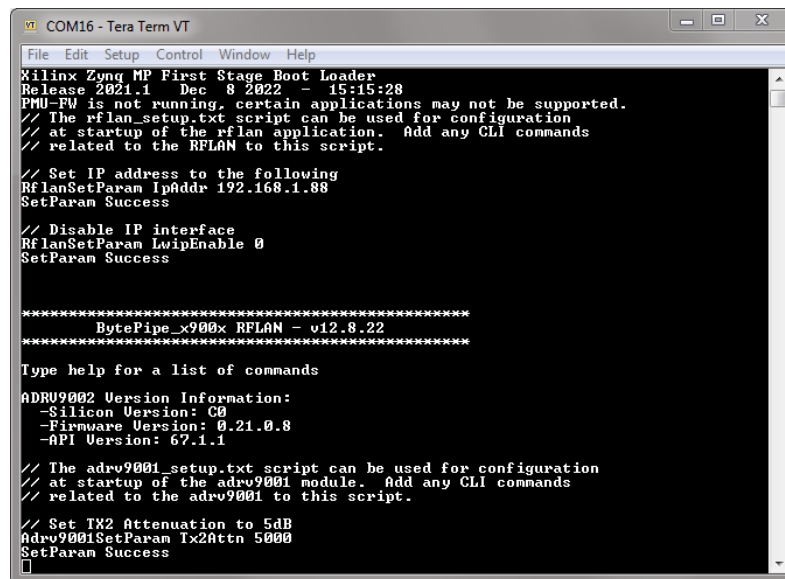
7. Flip the HDK power switch to the “ON” position.



Figure 16: Power Switch – ON

8. On the PC or laptop, open a serial terminal such as TeraTerm, select serial connection to the enumerated COM port, and set the baud to 115200.

Note: The COM port will only enumerate while the HDK is powered. Once powered down, the serial port will be disconnected.



```
COM16 - Tera Term VT
File Edit Setup Control Window Help
Xilinx Zynq MP First Stage Boot Loader
Release 2021.1 Dec 8 2022 - 15:15:28
PMU-FW is not running, certain applications may not be supported.
// The rflan_setup.txt script can be used for configuration
// at startup of the rflan application. Add any CLI commands
// related to the RFLAN to this script.

// Set IP address to the following
RflanSetParam IpAddr 192.168.1.88
SetParam Success

// Disable IP interface
RflanSetParam LwipEnable 0
SetParam Success

*****
BytePipe_x900x RFLAN - v12.8.22
*****

Type help for a list of commands
ADRV9002 Version Information:
-Silicon Version: C0
-Firmware Version: 0.21.0.8
-API Version: 67.1.1

// The adrv9001_setup.txt script can be used for configuration
// at startup of the adrv9001 module. Add any CLI commands
// related to the adrv9001 to this script.

// Set TX2 Attenuation to 5dB
Adrv9001SetParam Tx2Attn 5000
SetParam Success
```

Figure 17: Serial Command Line Interface (CLI)

Additional Information

Additional information and more detailed instructions can be found on NextGen RF Design's website and GitHub page:

<https://www.nextgenrf.com/products/bytepipe-x9002-system-on-module/>

https://github.com/NextGenRF-Design-Inc/bytepipe_sdk

Distributor Links

NextGen RF Design BytePipe products can be purchased through Richardson RFPD.

All products: https://shop.richardsonrfd.com/Supplier/Index/NextGen_RF_Design

[HDK \(without SOM\)](#)

[HDK + SOM Kits](#)

[SOMs](#)

[SOM Heatsink and Fan](#)

Additional or replacement SMPM RF adapters can also be ordered. Use only the following MPN's to ensure compatibility.

- Molex 73300-0220 <https://shop.richardsonrfd.com/Products/Product/0733000220>

Document Revision History

ECO Number	Comments	Initials	Revision	Date Revised
	Initial draft	GA	A	03/13/2023
CR-115	Initial release	GA	A1	03/17/2023
CR-125	Formatting and content updates	GA	A2	04/25/2023
CR-132	Remove Amphenol MPN from adapters list	GA	A3	05/30/2023