



FPGA Software Installation and Firmware Update Instructions – RAVE 3.0, AMR

AMD Versal Plus Ryzen Mini-ITX Board
VPR-4616-MB
VPR-5050-MB

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SAPPHIRE - Embedded+ Initial Platform Install & Config

This page captures the steps to bring-up the [Embedded+](#) platform configuration for the x86 Host and Versal SoC device enablement.

Hardware Setup:

Embedded+ system is comprised of a Versal SoC and a Ryzen SoC. The primary interfaces between these SoCs are PCIe and JTAG. Users interact with the Ryzen SoC through conventional means such as a keyboard and monitor, or via SSH once Linux is installed. Two UART ports are connected to the Versal SoC for debugging purposes only; they are not intended as the primary interface for Embedded+.

This documentation assumes the user possesses an Embedded+ system with OSPI pre-programmed at the factory, as this is the standard shipping configuration. The user will install Linux on the Ryzen X86 first, enabling subsequent interfacing with the Versal SoC.

i The OSPI binary prebuilts in this release targets VPR-4616, VPR-4616-sys, and VPR-5050. They do not target VPR-5050A as VPR-5050A has a different Versal HW configuration (DDR & MIO configs).

x86 Host OS

This section guide user to install Linux on X86, update OSPI and install AMI driver, tool and library

i Steps 1-3 are necessary for VPR-4616/5050-MB only. VPR-4616/5050-SYS has preloaded software and this section is not necessary.

If you have already done Ubuntu installation for XRT flow, skip to step 2, OSPI flashing.

1. Install the x86 host OS. Instructions and the image are available directly from Canonical:
 - a Requires a USB stick, keyboard, monitor, mouse, and ethernet connection
 - b Install instructions: <https://ubuntu.com/tutorials/install-ubuntu-desktop#1-overview>
 - c OS image download: <https://releases.ubuntu.com/jammy/>
2. Update OSPI with AMR OSPI.
 - a OSPI binary at <https://account.amd.com/en/forms/downloads/xef.html?filename=emb-plus-ospo-ami-emb-plus-ve2302-ami-20260609231841.bin> and follow the instruction of the link to update: [GitHub – Xilinx/embpf-bootfw-update-tool](#). You will need to install git and hw_server.
 - b After installation of the utility and its dependencies, the command to update OSPI is:

```
sudo ./prog_spi.sh -d embplus -Vpv -i <path to emb-plus-ospo-ami-emb-plus-ve2302-ami-  
<version>.bin>
```

3. Install the AMI drivers on the x86 host.

a Get the latest AMI *.deb* files from:

https://account.amd.com/en/forms/downloads/xef.html?filename=amitool_3.0.0-0.ccbd60b8.20260610_amd64.deb

https://account.amd.com/en/forms/downloads/xef.html?filename=ami_3.0.0-0.ccbd60b8.20260610_amd64.deb

https://account.amd.com/en/forms/downloads/xef.html?filename=libami_3.0.0-0.ccbd60b8.20260610_amd64.deb

b Move *.deb packages to the Embedded+ platform running Ubuntu 22.04

c Install the AMI driver, tool and library package with the following, and install any dependencies that's required:

Install AMI driver
<pre>sudo dpkg -i ami_3.0.0-0.ccbd60b8.20260610_amd64.deb</pre>
<pre>sudo dpkg -i amitool_3.0.0-0.ccbd60b8.20260610_amd64.deb</pre>
<pre>sudo dpkg -i libami_3.0.0-0.ccbd60b8.20260610_amd64.deb</pre>

d The previous step may take some time as it will build the driver locally on target. After it completes verify that the drivers are installed correctly using: *lsmod*

Lsmod
<pre>d773@d773-desktop:~/Desktop/embpf-bootfw-update-tool-4.0\$ sudo lsmod grep -i ami ami 237568 0</pre>

4. Reboot the system by doing a shut down (sudo poweroff) make sure that bootmode J5 is set to the default (not populated, QSPI boot) before powering back on again.

Refer to <https://github.com/Xilinx/amr> for more information on how to build AMR firmware, software and how to use AMI tools.

On-target Test

The following are self-test that the user can run to test that the Versal and x86 host are set-up and configured correctly.

PCIe Connectivity

Use *lspci* to inspect if Versal device is present on PCIe bus.

lspci -vd 10ee:

```
d773@d773-desktop:~/Desktop$ sudo lspci -vd 10ee:
01:00.0 Processing accelerators: Xilinx Corporation Device 5710
Subsystem: Xilinx Corporation Device 000e
Flags: bus master, fast devsel, latency 0, IOMMU group 8
Memory at fc000000 (64-bit, non-prefetchable) [size=8M]
Memory at fff0010000 (64-bit, prefetchable) [size=64K]
Memory at ffe0000000 (64-bit, prefetchable) [size=256M]
Capabilities: [40] Power Management version 3
Capabilities: [60] MSI-X: Enable- Count=32 Masked-
Capabilities: [70] Express Endpoint, MSI 00
Capabilities: [100] Advanced Error Reporting
Capabilities: [1c0] Secondary PCI Express
Capabilities: [1f0] Virtual Channel
Kernel driver in use: ami
Kernel modules: ami

01:00.1 Processing accelerators: Xilinx Corporation Device 5711
Subsystem: Xilinx Corporation Device 000e
Flags: bus master, fast devsel, latency 0, IOMMU group 8
Memory at fb000000 (64-bit, non-prefetchable) [size=16M]
Memory at fff0000000 (64-bit, prefetchable) [size=64K]
Memory at ffd0000000 (64-bit, prefetchable) [size=256M]
Capabilities: [40] Power Management version 3
Capabilities: [60] MSI-X: Enable+ Count=32 Masked-
Capabilities: [70] Express Endpoint, MSI 00
Capabilities: [100] Advanced Error Reporting
Kernel driver in use: xdma
Kernel modules: xdma, ami
```

AMI Platform Inspection

Use ami overview to see platform information.

ami_tool

```
d773@d773-desktop:~/Desktop$ sudo ami_tool overview
[sudo] password for d773:
```

AMI

```
Version      | 3.0.0  (0)
Branch      |
Hash        | ccbd60b8693ab0846a921a7c6f71729effdd1104
Hash Date   | 20260512
Driver Version | 3.0.0  (0)
```

BDF	Device	Serial Number	UUID	AMC	State
01:00.0	VPR-5050	52H2535000008	000000000000000000000009f1931ed	3.0.0 (0)	READY

Note that the UUID compatible with AMR flow release 3.0 is 00000000000000000000000009f1931ed.

AXI PCIE GPIO Test

The GPIO Driver for PCIe Interface test can be found at <https://github.com/Xilinx/axi-gpio-pcie-module>

Refer to <https://github.com/Xilinx/axi-gpio-pcie-module> for instructions to run GPIO tests.

Debug Tools – Versal Serial Console

The Versal serial console is connected to the Ryzen device on the motherboard. Therefore user can access the uart outputs from Ryzen. In Ubuntu, first download picocom:

Install picocom
<pre>sudo apt-get install picocom</pre>

Then user can access the com ports on commandline from Ubuntu:

Connect to APU serial output:
<pre>sudo picocom -b 115200 /dev/ttyUSB1</pre>

Connect to PLM/RPU serial output:
<pre>sudo picocom -b 115200 /dev/ttyUSB2</pre>

Repositories

The following links are the sources of this example artifacts

<https://github.com/Xilinx/amr>

<https://github.com/Xilinx/axi-gpio-pcie-module>

The following repository contains the Yocto meta layer for the Embedded+ platforms:

<https://github.com/ilinx/meta-embedded-plus>

Released Artifacts, Source Code, and License Information:

<https://edf.docs.amd.com/en/latest/downloads-and-release-notes.html#embedded-images>

FPGA (Xilinx) F/W Update

The VPR-4616/5050-MB and VPR-4616-SYS are both shipped with OSPI image. You can check their version with “ami_tools overview” command. Each release is based on a particular AMD tool version, and the released OSPI bin file contains a specific UUID the rest of the applications look for.

Release	AMD tool version	Bin file name	UUID
2.0	2025.1.1	emb-plus-ospi-emb-plus-ospi-amr-emb-plus-ve2302-amr-20250912165411.bin	00000000-0000-0000-0000-00009b62426
3.0	2026.1	emb-plus-ospi-amr-emb-plus-ve2302-amr-20260609231841.bin	00000000-0000-0000-0000-00009f1931ed

Upgrading OSPI is necessary if the UUID does not match the release.

Please follow the instruction of the link for update

[GitHub – Xilinx/embpf-bootfw-update-tool](#)