

AMD Embedded Linux Driver 2025.20 Release Notes

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Chapter 1 Overview

***Note:** This Ubuntu software package shall be used for evaluation purposes only. Customers using this package in production environments or using this package for further distribution must ensure that Ubuntu license terms are adhered to. Contact your AMD FAE for more information.*

AMD's Linux® Driver includes an open source graphics driver for AMD's embedded platforms and other peripheral devices on selected development platforms.

New features supported in this release:

- Kernel Migration to 6.12.25 LTS.
 - eSPI Rel-4 driver patch porting on new 6.12.25 kernel
 - PCI driver for SPI2 controller and SPI NAND support patches porting on new 6.12.25 kernel
- Bug Fixes

Chapter 2 Linux® Kernel Support

- 6.12.25 LTS

Chapter 3 Linux Distribution Support

- Ubuntu 24.04.2

Chapter 4 Component Versions

The following table shows git commit details of the sources and binaries used in the package.

The patches present in the patches folder of this release package must be applied on top of the git commit mentioned in the following table to get the full sources corresponding to this driver release. The sources directory in this package contains patches pre-applied to these commit IDs.

| Component Name | Version | Commit ID | Source Link for git clone |
|-------------------------------|-------------|--|---|
| Kernel | 6.12.25 LTS | ef4999852d307d38cfdec91ed6892cc03beb9b8 | https://github.com/gregkh/linux/commits/v6.12.25 |
| Libdrm | 2.4.125 | 76a1e97a9a7c29fa3035bb370d654791bdc23d90 | https://gitlab.freedesktop.org/mesa/libdrm/-/tree/libdrm-2.4.125 |
| Mesa | 25.1.3 | ba95e694fed5276f9b83dac70a0c19530ee47fb1 | https://gitlab.freedesktop.org/mesa/mesa/-/tree/mesa-25.1.3 |
| Ddx | 23.0.0 | 7025aefcdf9673665588cf291c5d71beb39cce89 | https://gitlab.freedesktop.org/xorg/driver/xf86-video-amdgpu/-/tree/xf86-video-amdgpu-23.0.0 |
| Wayland | 1.23.92 | 53fbc2b0c1dc70b3a96740ab0ceff6a9fe09b940 | https://gitlab.freedesktop.org/wayland/wayland |
| Libva | 2.22.0 | 217da1c28336d6a7e9c0c4cb8f1c303968a675f1 | https://github.com/intel/libva.git |
| LLVM | 19.1.3 | ab51eccf88f5321e7c60591c5546b254b6afab99 | https://github.com/llvm/llvm-project |
| Firmware | Main | b944ef71203d4d710cfde822de81f7aae955d71c | https://git.kernel.org/pub/scm/linux/kernel/git/firmware/linux-firmware.git |
| Vulkan | 2025.Q2.1 | 66d23ef671b19b488ddd2408954737be4b53458 | https://github.com/GPUOpen-Drivers/AMDVLK/commits/v-2025.Q2.1/ |
| Supported Applications | | | |
| LunarG Vulkan SDK | 1.4.313.0 | NA | https://vulkan.lunarg.com/sdk/home#linux |
| Vulkan CTS | 1.4.3.0 | | https://github.com/KhronosGroup/VK-GL-CTS/tree/vulkan-cts-1.4.3.0 |
| RGP | 2.4 | NA | https://github.com/GPUOpen-Tools/radeon_gpu_profiler/tree/v2.4 |

Chapter 5 Features Supported on Ryzen™ Embedded processors

Supported features are shown in the following table.

| Feature Group | Feature Supported | V1500 | V3000 | V2000 | R2000 |
|-------------------------|---|-------|-------|-------|-------|
| 2D | 2D acceleration | NA | NA | Yes | Yes |
| 3D | EGL 1.4, 1.5, EGL extensions. | NA | NA | Yes | Yes |
| | OGL 4.5, OGL 4.6 | NA | NA | Yes | Yes |
| | GLX 1.4 | NA | NA | Yes | Yes |
| | DRI3 support | NA | NA | Yes | Yes |
| | DRI3 updates (VDPAU, VAAPI) | NA | NA | Yes | Yes |
| | Vulkan Open Source | NA | NA | Yes | Yes |
| 2D | 10 bit Display | NA | NA | No | No |
| Audio | DP Audio supports for standard | NA | NA | Yes | Yes |
| Audio | I2S Audio | NA | NA | Yes | Yes |
| Display | EDID (Basic) | NA | NA | Yes | Yes |
| Display support | X and Desktop support | NA | NA | Yes | Yes |
| | Tear Free Desktop | NA | NA | Yes | Yes |
| | Partial support RandR 1.4 capabilities | NA | NA | Yes | Yes |
| | Kernel Mode Setting | NA | NA | Yes | Yes |
| | 4K60Hz display support | NA | NA | Yes | Yes |
| | Multi-GPU support (see table below for dGPU pairing) | NA | NA | No | No |
| | Number of displays supported (see display support table below) | NA | NA | - | - |
| | 4K cinema | NA | NA | Yes | No |
| | DP MST | NA | NA | Yes | Yes |
| | Single Large Surface (SLS) | NA | NA | Yes | No |
| Play back | Play back support MPV player using VAAPI / VDPAU | NA | NA | Yes | Yes |
| | Play back support for Gstreamer using VAAPI, gstomx (not recommended) | NA | NA | Yes | Yes |
| | 1080p 24fps, 30 fps and 60fps video play back | NA | NA | Yes | Yes |
| | 4k 30fps video play back | NA | NA | Yes | Yes |
| | 4k 60fps video play back | NA | NA | Yes | Yes |
| Power Management | Power Play support to re-clock | NA | NA | Yes | Yes |

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| Feature Group | Feature Supported | V1500 | V3000 | V2000 | R2000 |
|---|--|-------|-------|-------|-------|
| | Initial GPU reset support | NA | NA | Yes | Yes |
| | Power Play sysfs interface for manually selecting clock speeds | NA | NA | NA | Yes |
| | S3 | Yes | Yes | Yes | Yes |
| | S5 | Yes | Yes | Yes | Yes |
| VDPAU Post Processing | Deinterlace | NA | NA | Yes | Yes |
| VDPAU Post Processing | Edge Enhancement | NA | NA | Yes | Yes |
| VAAPI Postprocessing | Deinterlace | NA | NA | Yes | Yes |
| Transcode | 4k Encode | NA | NA | Yes | No |
| Video Quality | Scaling and color space conversion (CSC) | NA | NA | Yes | Yes |
| | Pull down detection and Deinterlacing | NA | NA | Yes | Yes |
| | Support for software scaling | NA | NA | Yes | Yes |
| | Support for hardware scaling | NA | NA | No | Yes |
| | 10-bit Decode with 10-bit render | NA | NA | NA | Yes |
| Compute | OpenCL | NA | NA | No | No |
| dGMA –OpenGL | | NA | NA | Yes | NA |
| dGMA - OpenCL | | NA | NA | No | NA |
| fTPM | | Yes* | Yes | Yes | Yes |
| RJ45-10G-Base-T (Marvell PHY) | 10M | Yes* | Yes | NA | NA |
| | 100M | Yes* | Yes | NA | NA |
| | 1G | Yes* | Yes | NA | NA |
| | 2.5G | No | Yes | NA | NA |
| | 10G | Yes* | Yes | NA | NA |
| SFP+ (connector) | 10M | No | Yes | NA | NA |
| | 100M | No | Yes | NA | NA |
| | 1G | Yes* | Yes | NA | NA |
| | 10GBASE_KR [AN=OFF, ON] | NA | Yes | NA | NA |
| | 2.5G [AN=OFF] | NA | Yes | NA | NA |
| | 10G | Yes* | Yes | NA | NA |
| AIC1 – Inphi CS4223 Optical Fiber PHY (SFP+) | 10M/100M/1G/10G | NA | Yes | NA | NA |
| AIC1 – TI DS125 Series Re-Timer (SFP+) | 10M/100M/1G/10G | NA | Yes | NA | NA |
| AIC2 – 1G-Base-T (Marvell 88E1512P) | 10M/100M /1G | NA | Yes | NA | NA |
| AIC2 – 10G-Base-T (Marvell AQR113C) | 10M/100M/1G/2.5G/10G | NA | Yes | NA | NA |

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| Feature Group | Feature Supported | V1500 | V3000 | V2000 | R2000 |
|--|---------------------------|-------|-------|-------|-------|
| AIC3 – 1G-Base-T (Broadcom BCM54220) | 10M/100M /1G | NA | Yes | NA | NA |
| AIC3 – 10G-Base-T (Broadcom BCM84892) | 100M/1G/2.5G/10G | NA | Yes | NA | NA |
| eMMC | BC | Yes | No | Yes | Yes |
| | HS200 | Yes | No | Yes | Yes |
| | HS400 | Yes | No | Yes | Yes |
| | (USB/PCIe to eMMC bridge) | No | Yes | No | No |
| SD Card | SD UHS I – SDR50 | Yes | No | Yes | Yes |
| | SD UHS I – SDR104 | Yes | No | Yes | Yes |
| | SD UHS I – SDR104 | Yes | No | Yes | Yes |
| Peripherals (I/O) | I2C | Yes | Yes | Yes | Yes |
| | USB | Yes | Yes | Yes | Yes |
| | USB 4.0 | No | Yes | No | No |
| | SATA | Yes | Yes | Yes | Yes |
| | UART | Yes | Yes | Yes | Yes |
| | WDT | Yes | Yes | Yes | Yes |
| | SMBUS | Yes | Yes | Yes | Yes |
| | SPI Kernel Driver | Yes** | Yes** | Yes** | Yes** |
| | eSPI | No | Yes | No | No |

*Bilby platform only

**To use the SPI kernel driver on Bilby/Fox platforms, the BIOS which has enabled SPI Entry in the ACPI table is required. The default BIOS does not have this feature. Please contact your FAE for the required BIOS.

Chapter 6 Features Supported on Ryzen™ Embedded processors with iGPU

The 2025.20 Linux driver is **not supported** by any AMD Embedded dGPUs.

HW codec and display support is only applicable to Ryzen Embedded processors with integrated graphics.

6.1 Display Support:

| Platform | Max Number of external 4K display(s) | |
|----------|--------------------------------------|---|
| R2000 | R2312 | 3 |
| | R2314 | |
| | R2514 | |
| | R2544 | 4 |
| V2000 | 4 | |
| V1500 | NA | |
| V3000 | NA | |

Chapter 7 Platforms Supported

| Embedded SoC Version | Models/OPN's | AMD Customer Reference board |
|---|--|------------------------------|
| Ryzen Embedded V3000 Series | V3C48, V3C44, V3C18I, V3C18, V3C16, V3C14, V3G18i, V3G48 | FOX |
| Ryzen Embedded V2000 Series with AMD Radeon Graphics | V2748, V2546, V2718, V2516 | CELADON |
| Ryzen Embedded V1500 | YE1500C4T4MFH, YE1500C4T4MFB | BILBY |
| Ryzen Embedded R2000 Series with AMD Radeon Graphics | R2314, R2312, R2514, R2544 | BILBY |

Chapter 8 Tested Platform Configurations

The following tables show the system configuration that was used for testing the driver package.

| V3000 Series | |
|---------------------|---|
| CPU | V3000 |
| OPNs | Latest Revision: AIC1; AIC2 ; AIC3; B1-DVT Sampels: V3C48;V3C18i;V3C44; V3C14; V3C16;V3C18, V3G18i, V3G48; |
| Board Type | Fox, Direct Mount |
| TDP | V3C48 (8-core 45W CPU) V3C44 (4-core 45W CPU) V3C18I (8-core 15W CPU extended temperature) V3C18 (8-core 15W CPU) V3C16 (6-core 15W CPU) V3C14 (4-core 15W CPU) V3G18I (8-core 15W CPU) V3G48 (8-core 45W CPU) |
| BIOS version | RFE100AA |
| Memory (DDR5) | 2x16 GB [Direct Mount] |
| DIMMs | DDR5, 4800 MT/s |
| Storage disk | Samsung M.2 NVME 500 Gb and SATA SSD Crucial 250 Gb |
| Ethernet connectors | <ul style="list-style-type: none"> 10G SFI Optical: Finisar (FTLX8574D3BCV and FTLX8574D3BCL), Intel (FTLX8574D3BCV-IT) 10G Optical DAC: Fiberstore (SFPP-A020) 10G KR (Backplane): Molex DAC cable (747521101) and AMPHENOL SFP DAC CABLE (571540002) 1G Bel SFP [SFP-1GBT-06] and Finisar [FCLF8520P2BTL] |

| V1500 | |
|--------------|------------------------------|
| CPU | V1500 |
| OPNs | YE1500C4T4MFH, YE1500C4T4MFB |
| TDP | 16-25W |
| BIOS version | RBB1211B_RV_PCO |
| RAM | 16GB (2x8GB DDR4 2400) |
| Storage disk | M.2 SATA |

| V2000 | |
|-----------------------------------|------------------|
| APU | V2000 |
| APU TDP | 10-25W, 35-54W |
| BIOS version | RCO100BA |
| VRAM setting | 4GB |
| RAM | 16GB |
| Display Convertors / Dongles Used | DP to HDMI, HDMI |
| Storage disk | SSD, M.2 |

| R2000 Series | |
|-----------------------------------|---|
| APU | R2000 |
| APU TDP | 12-25W (R2312), 12-35W (R2314, R2514), 35-54W (R2514) |
| BIOS version | RBB1006A |
| VRAM setting | 4GB |
| RAM | 16GB |
| Display Convertors / Dongles Used | DP to HDMI, HDMI |
| Storage disk | SSD, M.2 |

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Chapter 9 Issues Fixed

V3000 Issues:

Bytedance -V3000 XGBE ethtool Option Support

The AMD XGBE driver has completed implementation of the -t options, and it works similarly to the Intel ixgbe driver. As part of the -t option, the following test functions are executed in order:

1. MAC Loopback
2. PHY Loopback
3. Split Header
4. Jumbo Frame

-t support has been finalized and is ready for use.

The -c option is not yet implemented, so the final full requirement will be fixed in the next release

Chapter 10 Known Issues/Limitations

Generic Issues

1. SW installation time increased due to transition from Debian(install.sh) installation to source build(rbh.sh) installation.

| Steps | Time Taken | | | | |
|--|------------|---------|-------------|-------------|------------|
| | R2000 | V2000 | V1000/R1000 | V1500P | V3000 |
| sudo ./rbh.sh --prep kernel_source 2>&1 tee rbh_prepkernel.log | 4m 51s | 2m 54s | 4m 12s | 3m | 2m 32s |
| sudo ./rbh.sh --build kernel_source 2>&1 tee rbh_buildkernel.log | 55m 35s | 23m 11s | 47m 52s | 1hr 16m 2s | 29m 47s |
| sudo ./rbh.sh --builddall 2>&1 tee rbh_builddall.log | 55m 33s | 32m 26s | 49m 9s | 1hr 20m 40s | 32m 22s |
| sudo ./rbh.sh --postinstall 2>&1 tee rbh_postinstall.log | 8s | 7s | 8s | 9s | 8s |
| Total Time taken | 1hr 56m 7s | 58m 38s | 1hr 41m 13s | 2hr 39m 51s | 1hr 4m 49s |

V3000 Issues:

1. Use Ethernet DAC cable of length ≤ 5 meters.
2. V3000 is cpu variant, so make sure to add “nomodeset” in grub param
3. V3000 need to use in headless mode. If display is needed, then use E9175 dGPU
4. UART provisioned for 1 x4 wire and 4 x2 wire modes only
5. On Fox RJ45 and 2.5G or 1G speed selection in BIOS, hot-plug and hot-insert of cable always triggering speed switching to 10G. Issue specific to V3C18i OPN.
6. Ethernet stability issues
 - a. AIC1 InPhi Phy 10G link stability issue in P2P mode only; mitigating with switch as link partner instead of another Fox
 - b. Link detection issues on SFP Port 0/1 for 1G speed with FS copper module (SFP-GB-GE-T 1000BASE-T) with Cat 5 UTP cable
 - c. Link up failure issue after S3 on SFP+ Connector, with 1G/100M/10M as speed and 1G Bel modules connected on both the ports
 - d. Link up issues after S3 on AIC2-1G-BaseT phy ports
 - e. AIC3 BCM 10G phy has link stability issues for 100M/2.5G/1G speed modes, when using “ifconfig <i/f> down” command
 - i. For any BCM related phy issues, get in touch with BCM support
 - f. AIC3 Link up success but fails to get DHCP IP for 100M speed with 10G PHY
 - g. Randomly link up will fail on Inphi Phy 10G SFP+ (DAC/Optical) module Hot Plug and unplug multiple times.
 - h. With 10G KR AN ON sometimes link up takes very long time.
7. Refer “FOX Platform User Guide (ID: 57102)” from <https://devhub.amd.com/reference-platform/fox/> for USB-C J60 port, RJ45, AIC1, AIC2 and AIC3 rework details
8. Macronix spinand chip write fails with HID2 DMA support. (Working with Winbond spinand).

V1500 Issues:

1. Less throughput with 10G SFP+ ethernet port interfaces issue when both ports (Port-0 and Port-1) simultaneously executing iperf3 in bidirectional mode.
WA Solution: Compile 6.12.10 POR kernel using GCC version 11.4.0

XGBE:

1. [XGBE]: Force mode(Auto negotiation disabled) is not supported in RJ45.
2. Can't concurrently enable SFP+ and RJ45 interfaces.

Below is the type of SFP/RJ45 modules used in the XGBE validation of this release.

| Type | Model | Part Number |
|-----------------|---------|-----------------|
| 1G SFP - RJ45 | BEL | SFP-1GBT-06 |
| 10G SFP+ DAC 1m | Finisar | SFPP-PC01 |
| 10G SFP optical | Intel | AFBR-709DMZ-IN3 |

Chapter 11 Support

Please contact your Field Applications Engineer for support on this release.