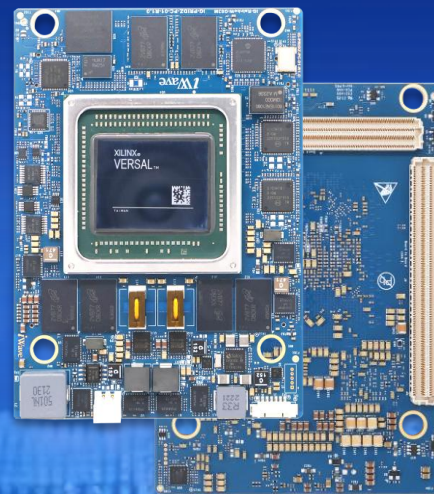


eBook

Versal™ Solutions from iWave

Enabling AI Engines, RF Systems & Industrial Processing Systems

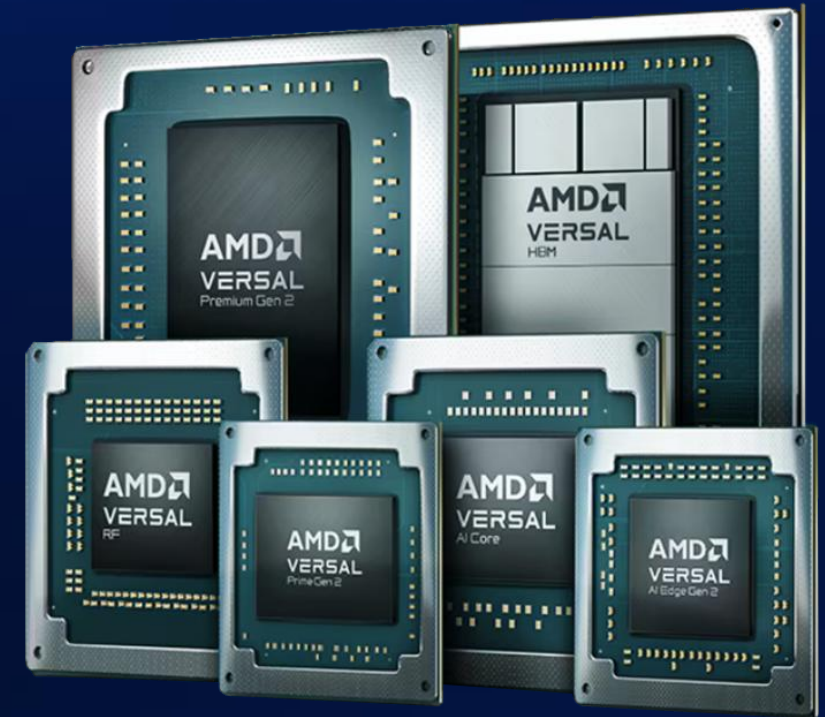


What is Versal™ Adaptive SoC?

Versal™ is AMD's Adaptive SoC that combines scalar processing, programmable logic, and domain-specific acceleration engines on a single device.

Unlike traditional SoCs or FPGAs, Versal™ integrates CPUs, programmable logic, AI Engines/DSP engines, and a high-bandwidth Network-on-Chip (NoC), enabling software-programmable acceleration across a wide range of workloads—from embedded edge to data center and defense applications.

This heterogeneous architecture allows designers to map the right compute engine to the right task, delivering high performance, deterministic latency, and system-level flexibility in a single platform.



Why Versal™?

- Heterogeneous Compute Architecture
- Software-Programmable Acceleration
- High-Bandwidth, Deterministic Data Movement
- Adaptability for Evolving Workloads
- Integrated high-speed transceivers supporting multi-gigabit serial communication over standard interfaces
- Scalable Portfolio for Multiple Domains

Versal™ Applications

Aerospace and Defense

Radar systems & phased-array radar
MILCOM radios & secure communications
Avionics, UAS, UAM & mission computing



Network Infrastructure

5G / Pre-6G / 6G radio systems
Beamforming & massive MIMO
xHaul gateways & wireless backhaul



Medical

Ultrasound imaging systems
Endoscopy & surgical robotics
Medical image processing & diagnostics



Automotive & Autonomous Systems

ADAS & autonomous driving platforms
Radar, LiDAR & vision sensor processing
Domain controllers & CPU accelerators



Versal™ System on Module

What & Why ?

Core Components

- Versal™ Adaptive SoCs

Memory & Storage

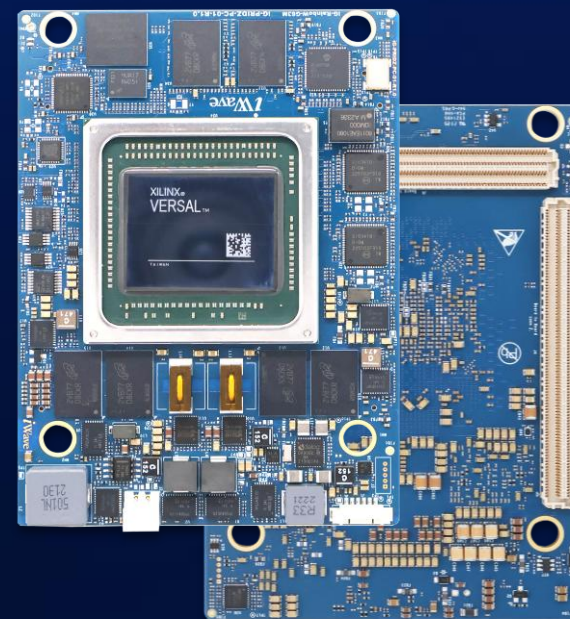
- Up to 8GB LPDDR4 RAM for PS
- Up to 8GB LPDDR4 RAM for PL
- Up to 128GB eMMC Flash
- 256MB QSPI Flash and EEPROM

Connectivity

- 2 x 400 pin B2B Connectors
- 1 x 128 pin B2B Connectors
- 16/8 x ADC Channels up to 8/32Gsps
- 16 x DAC Channels up to 16GspsGsps
- 20/10 GTM2 High Speed Transceivers (Up to 56Gbps/112Gbps)

Power & Thermal

- Rugged Mechanical enclosure with thermal solution



Why consider Versal™ System on Module?

- Proven signal integrity, memory tuning, clocking, and power sequencing
- Reduces development cost and design risk
- Accelerates time-to-market with pre-validated Hardware and BSPs
- Production-ready and scalable across the Versal family
- Pre-enabled Linux, Vitis, and AI software ecosystem
- Long-term product lifecycle & supply management

Versal™ Boards & Solutions



System on Modules

An extensive portfolio of System on Modules across the Versal™ product family ensuring the right product fit as per your requirements. The System on Modules are all pre-qualified, validated and production ready.



3U VPX and PCIe Cards

Versal™ based COTS modules for the aerospace, defense, networking and storage applications. The portfolio of VPX Cards are available across different FPGA variants.

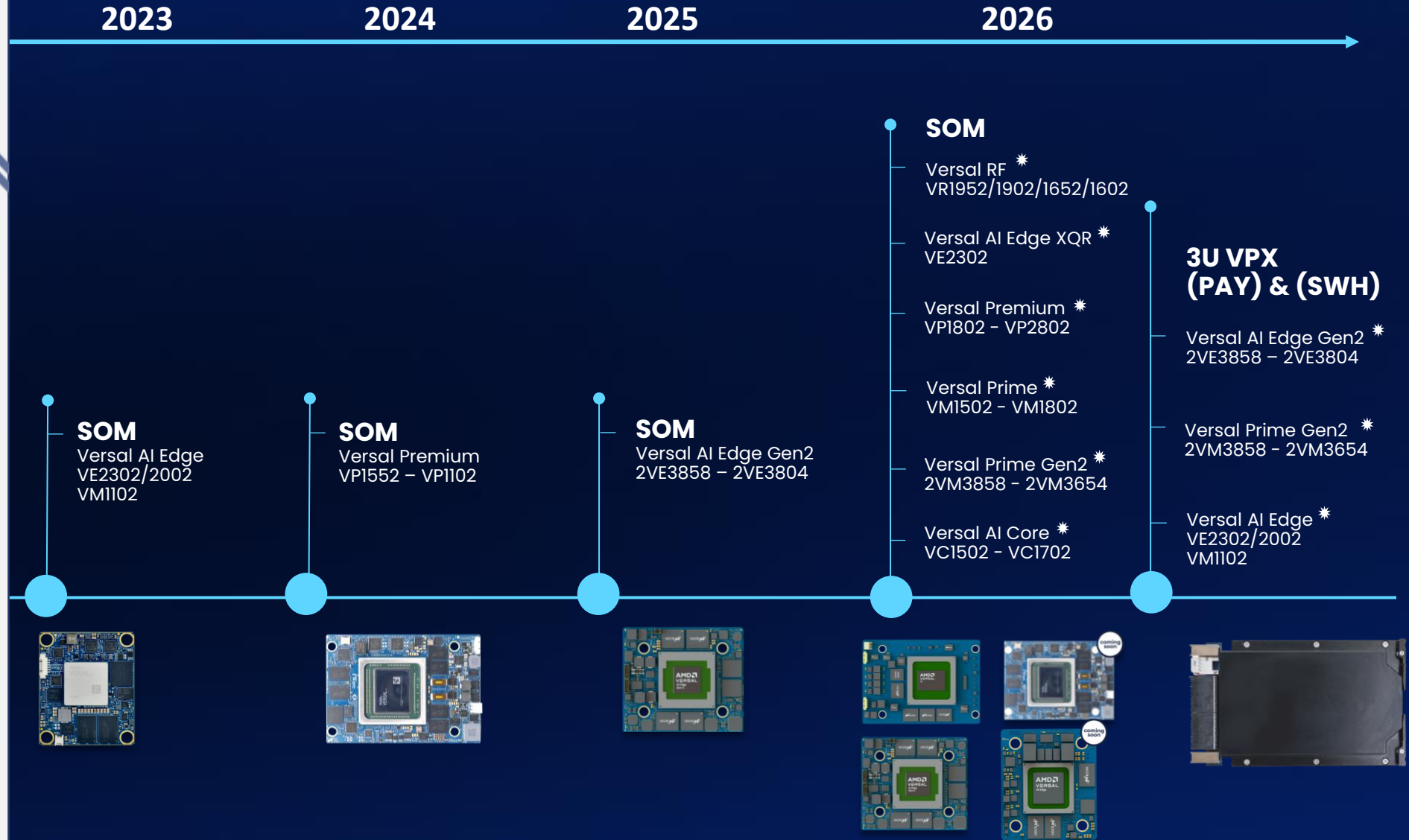


Custom Design

iWave enables customers with custom carrier card and system design. iWave carries Versal™ ODM expertise to enable your products from ideation to production.

Versal™ Solutions Roadmap

Performance



* This icon signifies "Coming Soon."

System on Module Portfolio

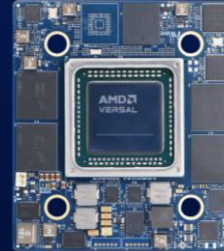
iG-G57M



Versal AI Edge

- Compatible with VE2302, VE2202, VE2102, VE2002 & VM1102 Devices
- 8 x GTYP transceivers up to 32Gbps
- Up to 328K Logic cells & 150K LUTs

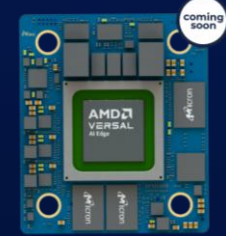
iG-G77M



Versal AI Edge Gen2

- Compatible with 2VE3858, 2VE3804, 2VE3558 & 2VE3504 Devices
- 24 x GTYP transceivers up to 32Gbps
- Up to 1188K Logic cells & 543K LUTs

iG-G57M-SP



Versal AI Edge XQR

- Compatible with XQRVE2302 device
- 8 x GTYP transceivers up to 26.5Gbps
- Up to 329K Logic Cells & 150.272K LUTs

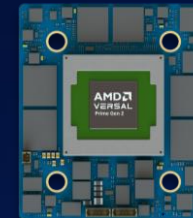
iG-G83M



Versal Prime

- Compatible with VM1502, VM1802 & VE1752 devices
- 44 x GTY transceivers up to 28.21Gbps
- Up to 1,968K Logic cells & 899K LUTs

iG-G77M



Versal Prime Gen2

- Compatible with 2VM3858, 2VM3654 & 2VM3558 Devices
- 24 x GTY transceivers up to 32Gbps
- Up to 1188K Logic cells & 543K LUTs

System on Module Portfolio

iG-G63M



Versal Premium

- Compatible with VP1552, VP1502, VP1402, VP1202, & VP1102 Devices
- 56 x GTM transceivers up to 112Gbps PAM4
- 12 x GTYP transceivers up to 32Gbps NRZ
- 16 x GTYP LPD transceivers for PCIe GEN5

iG-G81M



Versal Premium

- Compatible with VP1802, VP2502, VP1702 & VP2802 Devices
- 12 x GTYP Transceivers up to 32.75Gbps
- 16 x GTYP Transceivers for PCI CPM5
- 140 GTM Transceivers up to 112Gbps PAM4

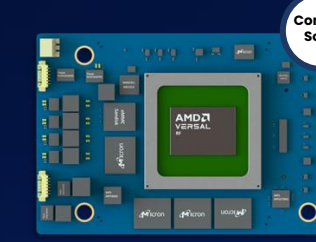
iG-G83M



Versal AI Core

- Compatible with VC1502, VC1702, VC1802, & VC1902 Devices
- 44 x GTY transceivers up to 28.21Gbps
- 1,968K Logic cells & 899,840 LUTs
- 72 LVDS Pairs and 188 SE FPGA IOs

iG-G80M



Versal™ RF Series

- Compatible with VR1952, VR1902, VR1652, & VR1602 Devices
- 16/8 ADC Channels up to 8/32Gbps
- 16 DAC Channel support up to 16Gbps
- 20/10 GTM2 Transceivers up to 112Gbps/56Gbps

Versal™ AI Core



Processing System (PS)

- Dual® Arm® Cortex-A72
- Dual Arm Cortex-R5F

Programming Logic (PL)

- Up to 1,968K Logic cells & 899,840 LUTs
- 44 x GTY transceivers up to 28.21Gbps

Memory & Storage

- 3 x 64bit, 4GB LPDDR4
- 16GB eMMC Flash
- 256MB QSPI Flash, EEPROM

Features

- 10/100/1000 Ethernet PHY with PTP
- USB2.0 PHY, Clock Generator



FPGA

- Versal™ AI Core Family with VSVA2197 Package
- Compatible with VC1502/1702/1802/1902 devices

Programming Logic (PL)

- Up to 1,968K Logic cells & 899,840 LUTs
- 44 x GTY transceivers up to 28.21Gbps

3 x Board to Board Connectors

- 72 LVDS Pairs and 188 SE FPGA IOs
- 28 x GTY Transceivers
- 16 x GTY Transceivers

General

- Power Input: 12V through B2B Connector2
- Form Factor: 82mm x 110mm

Versal™ RF Series



Processing System (PS)

- Dual® Arm® Cortex-A72 @1.65GHz
- Dual Arm Cortex-R5F @800MHz

Programming Logic (PL)

- Up to 2,473.8K Logic cells & 1,130.88K LUTs
- GTM2 High Speed Transceivers x 20 @112 Gbps

AI Engine (AIE)

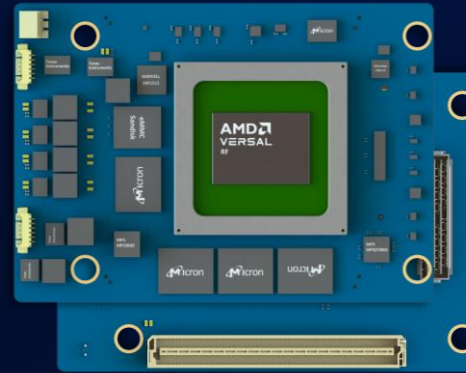
- AI Engine Tiles up to 126
- AI Data Memory up to 32Mb

High Performance Memory

- 32bit, 4GB LPDDR5X from PS
- 32bit, 4GB LPDDR5X from PL
- 2 x Dual Channel (2x16bit) 4GB
- LPDDR5X from PL

Storage

- 32GB eMMC Flash, 2Kb EEPROM
- 256MB (8bit) OSPI Flash or 256MB (4bit)
- QSPI flash from PS



FPGA

- Versal™ RF Family with VSVA2488 Package
- Compatible with VR1952/1902/1652/1602 devices

ADC / DAC

- 16/8 x ADC Channels up to 8/32Gsps
- 16 x DAC Channels up to 16Gsps

2 x 400pin Board to Board Connectors

- X5IO Bank IOs – up to 64LVDS/128SE
- HD Bank IOs – up to 11DIFF/22SE

High-Speed Transceivers

- PCIe x4 Gen5 through GTYP Transceivers
- 20/10 GTM2 High Speed Transceivers
- (Up to 56Gbps/112Gbps)
- or 12 GTYP High Speed Transceivers (Up to 32Gbps)

General

- Power Input: 12V through B2B Connector2
- BSP Support: Linux BSP: Yocto 2025.1 or higher

Unique Features of Versal™ SOM from iWave

iWave extends AMD Versal™ capabilities with production-ready engineering features that reduce risk and accelerate deployment.

Versal™ AI Edge

- ✓ AI Engine-ML support
- ✓ DRAM memory with LPDDR4 support up to 4266Mbps
- ✓ Up to 8 High speed transceiver 32 Gbps
- ✓ Supports PCIe Gen4 and 40G MAC
- ✓ On-SOM Ethernet PHY with 1Gbps support

Versal™ AI Edge Gen2

- ✓ Improved AI Engine-ML v2 support with greater AI tiles
- ✓ Supports GPU and Image Signal Processor
- ✓ Supports PCIe Gen5 and 100G MAC
- ✓ Pin compatible from Gen1 to Gen2 SOM

Versal™ Premium

- ✓ Improved APU & RPU for enhances processing system
- ✓ DRAM memory with three LPDDR4 support up to 4266 Mbps
- ✓ Up to 68 High speed GTM transceiver up to 112 Gbps
- ✓ Supports PCIe Gen5
- ✓ Supports 100G, 400G and 600G MAC

Compact, Pin-Compatible & Deployment-Ready Designs

- ✓ Pin-compatible Versal AI Edge Gen2 and Versal Prime Gen2 for easy scalability
- ✓ Pin-compatible Versal Premium and Versal RF for easy scalability
- ✓ Compact form factor reduces carrier board complexity and cost

Versal™ 3U VPX Card

SOSA
Sensor Open Systems Architecture

iWave
Global

Available in Payload & Switch Profiles

Versal™ AI Edge Gen2

Versal™ Prime Gen2

Versal™ AI Edge/Prime

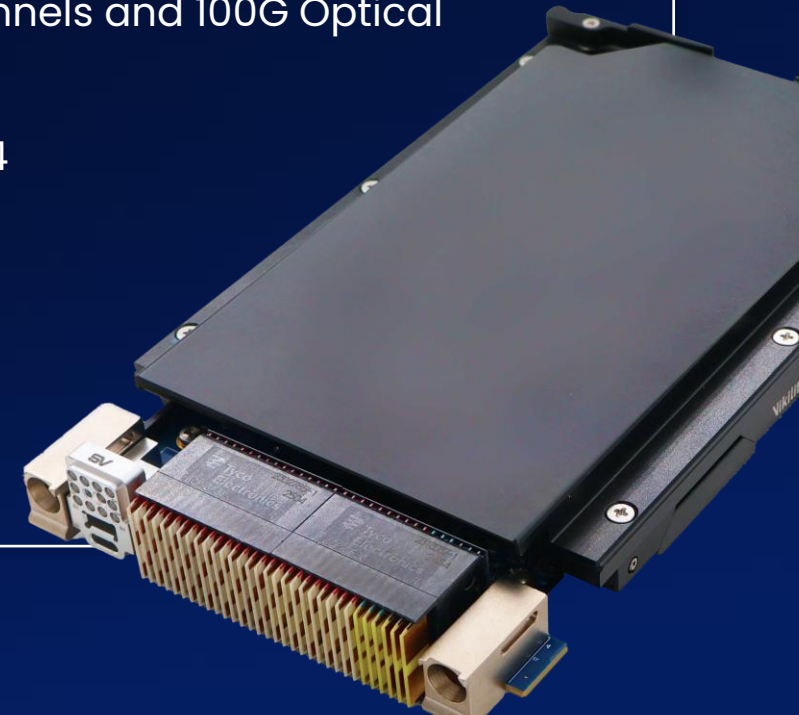
VITA 67.3 NanoRF Optical Hybrid Ferrule with 10 RF Channels and 100G Optical
4 x ADC & 4 x DAC with up to 1.6Gsps

Payload Slot Profile: SLT3-PAY-1F1U1S1S1U1U4F1J-14.6.13-4

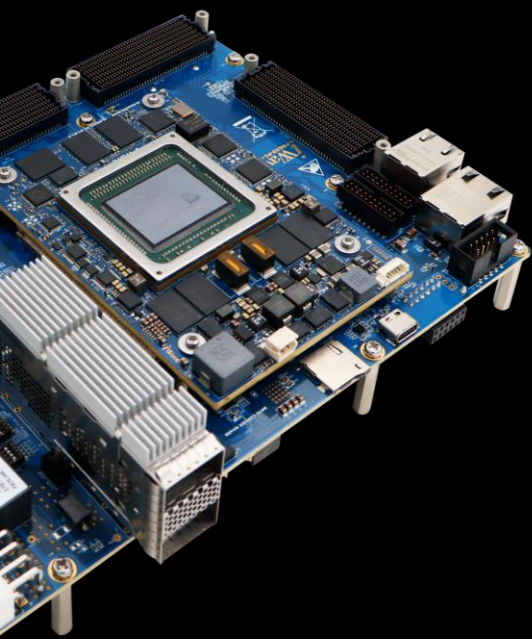
Switch Slot Profile: SLT3-SWH-4F1U7U1J-14.8.7-1

Slot Pitch: 1 inch Conduction Cooled

Also Supports other SLT3 slot profiles



ODM Expertise



Comprehensive Versal SoM System Design

- End-to-end design of **Versal AI Edge, AI Core, Prime, and Premium SOMs**, including low-power edge AI to ultra-high-performance compute
- Scalable SOM architectures supporting **AI inference, signal processing, networking** acceleration, aerospace, and defense applications
- Support for a wide range of interfaces such as **PCIe Gen4/Gen5, Ethernet (100G/400G/600G), JESD204B/C and MIPI**

Versal ACAP Integration Expertise

- Implementation of **AI Engine** for real-time AI inference
- Supporting **PCIe Gen5 and 100G Ethernet** for fast data transfer between the SOM, host, and network
- Connecting high-speed **ADCs and DACs** for radio, radar, and data-capture applications
- High-speed serial link design using **GTY/GTM transceivers for backplane**, optical, and copper interfaces
- **Designed for long lifecycle**, rugged, and mission-critical environments

Production & System-Level Support

- **Turnkey Production Services** including SoM + Carrier + Enclosure + Testing
- DFM (Design for Manufacturing) and DFT (Design for Test) best practices followed
- **Ruggedization and Space-grade validation** for Aerospace & Defense customers
- Product Longevity Support of up to **15+ Years**

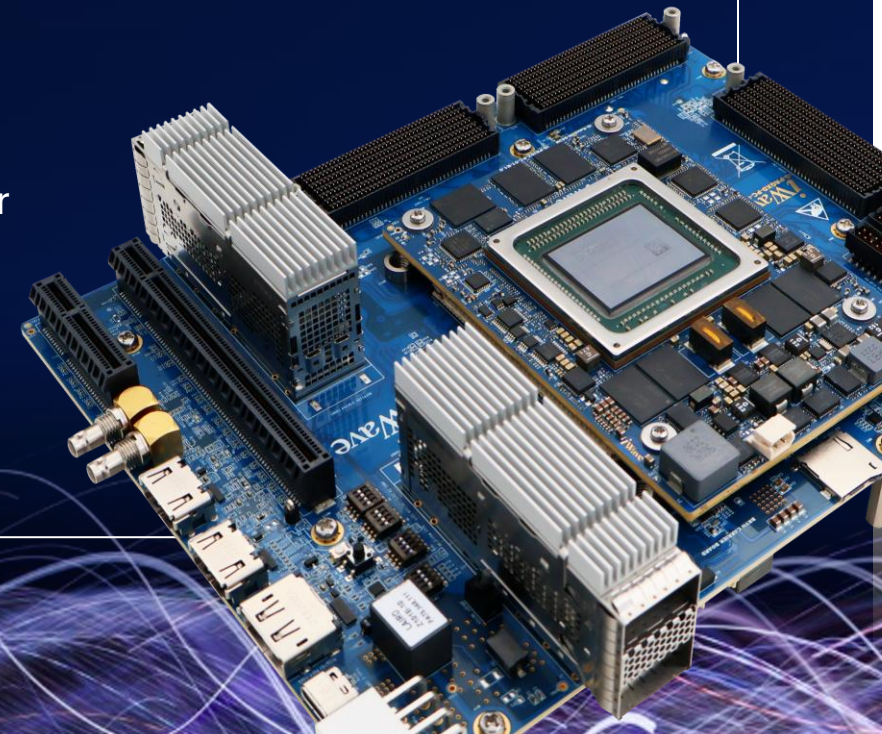
Software Features

- Yocto / PetaLinux-based Linux distribution with Vivado support for streamlined Versal system bring-up and hardware-software integration.
- Linux drivers and runtime support enabling access to Programmable Logic, AI Engines, DMA, and hardware accelerators from user space.
- AI Engine (AIE / AIE-ML) software stack with Vitis AI toolchain for model compilation, optimization, and deterministic AI inference.
- Pre-validated AI Engine examples for real-time video analytics, object detection, and industrial vision workloads.
- Bare-metal software support for ultra-low latency, deterministic control applications such as motor control and safety monitoring.
- Seamless deployment of compiled AI models and AIE graph binaries, controlled from Linux using XRT runtime.

Evaluation Platforms

Available in multi form factor such as BRYN+, BRYNc, REN, and REN+

- Dual Stacked QSFP12G Connector for 100G/400G/600G Ethernet interfaces
- Dual FMC+ HSPC Connector with high-speed transceivers and high-performance PL IOs
- FMC+ HSPC connector with high-performance and high-density PL IOs
- PCIe x16 Connector for CPM5 PCIe Interface
- PCIe x4 Connector for PL PCIe Gen4/Gen5 interface
- PCIe Gen5 Connector
- Dual Gigabit Ethernet through RJ45 Magjack
- 100G Ethernet through QSFP+ Connector
- 4K HDMI 2.0 IN and OUT through HDMI Connector
- 12G SDI Video IN and OUT through HD BNC Connector
- USB 3.0 and USB2.0 through Type C Connector
- PMOD Connector for PL IOs
- Micro SD connector for booting and storage
- GPIO Header for PS and PL IOs



Deliverables

- 1.Datasheet
- 2.B2B-ConnectorPinout
- 3.Schematic&PCB-CAD-Files
- 4.MechanicalFiles

- 1.QuickStartGuide
- 2.SOM
- 3.DevKit
- 4.Fansink

- 1.SOM
- 2.DevKit

- CADSymbol
- CarrierBoard-Schematic
- SchematicSymbol
- SOM-Schematic

- DevKit
- SOM

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lw-Rainbow-G57M-CU-R2.0-REL1.0-SD2.0-V24.1-Petalinux-VE2302
├── Documents
│   ├── FPGAUserGuide
│   │   └── lw-Rainbow-G57M-Versal-AI-Edge-SOM-SD2.0-Vlvado24.1-FPGAUserGuide-R2.0-REL1.0.pdf
│   ├── ReleaseNote
│   │   └── lw-Rainbow-G57M-Versal-AI-Edge-SOM-SD2.0-Petalinux24.1-ReleaseNote-R2.0-REL1.0.pdf
│   └── SoftwareUserGuide
│       └── lw-Rainbow-G57M-Versal-AI-Edge-SOM-SD2.0-Petalinux24.1-SoftwareUserGuide-R2.0-REL1.0.pdf
├── FPGA-Example-Design
│   ├── lw-G57M-2302-4L004G-E016G-BEB.zip
│   ├── README.txt
│   ├── VE2302-1LSE-R20-SD20-24_1-B1_0.zip
│   ├── VE2302-1LSE-R20-SD20-24_1-FH1_0.zip
│   ├── VE2302-1LSE-R20-SD20-24_1-FS1_0.zip
│   └── VE2302-1LSE-R20-SD20-24_1-I1_0.zip
├── Petalinux
│   ├── Base-Design
│   │   ├── Binaries
│   │   │   └── Binaries.zip
│   │   └── BSP
│   │       └── lwg57m-R20-SD20-REL1.0-base.bsp
│   ├── HDMI
│   │   ├── Binaries
│   │   │   └── Binaries.zip
│   │   └── BSP
│   │       └── lwg57m-R20-SD20-REL1.0-hdmi.bsp
│   └── NPU
│       ├── Binaries
│       │   └── sd_card.zip
│       ├── BSP
│       │   └── lwg57m-R20-SD20-REL1.0-npu.bsp
│       ├── Example_NPU_Design
│       │   └── Vitis-AI.zip
│       ├── Models
│       │   ├── snapshot.resnet50.zip
│       │   ├── snapshot.ssdResnet34.zip
│       │   └── snapshot.yolov2.bi.zip
│       ├── Scripts
│       │   ├── stream_resnet34.sh
│       │   ├── stream_resnet50.sh
│       │   └── stream_yolov2.sh
│       └── SDI
│           ├── Binaries
│           │   └── Binaries.zip
│           └── BSP
│               └── lwg57m-R20-SD20-REL1.0-sdi.bsp
└── Tools
    ├── ClockFiles
    │   ├── G570-S15332-C52-REL1.0-S15332_slabtimeproj
    │   ├── G570-ZL30733-C51-HDMI-REL1.0.mfg
    │   ├── G570-ZL30733-C51-SDI-REL1.0.mfg
    │   ├── z130733_c_header_gen.sh
    │   └── z130733_c_header.txt
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Human Spaceflight Multimedia Processing System Versal AI Core VC1902 System on Module

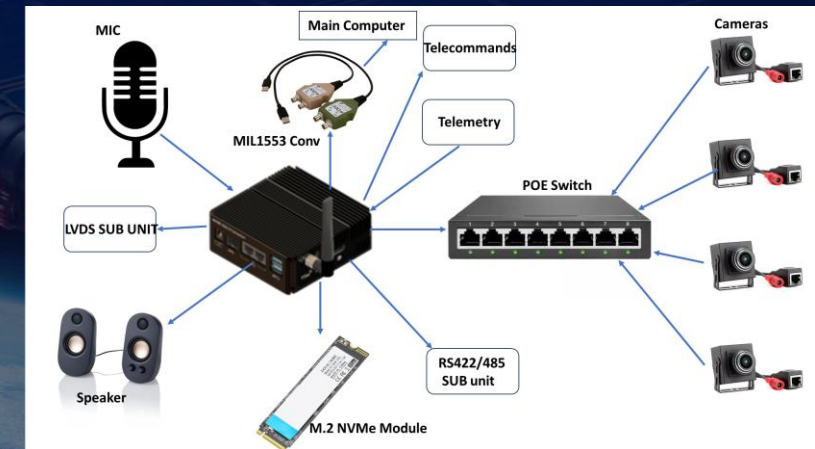
Case Study

Customer Background

The customer develops payloads for human spaceflight applications, requiring highly reliable and deterministic systems with long-term availability. For this program, they needed a multimedia processing platform to enable real-time, full-duplex audio and video communication between onboard crew systems and ground stations.

iWave Scope of Work

iWave designed and delivered a Versal™ AI Core VC1902-based System on Module, integrating the processing system, programmable logic, power regulators, memory, and clocking circuitry. Along with the SoM, a custom carrier card was developed to meet application-specific interface requirements. iWave also provided comprehensive BSP and driver support with long-term software maintenance to ensure seamless system integration, while committing to long-term supply and production scalability to support annual volume deployments.



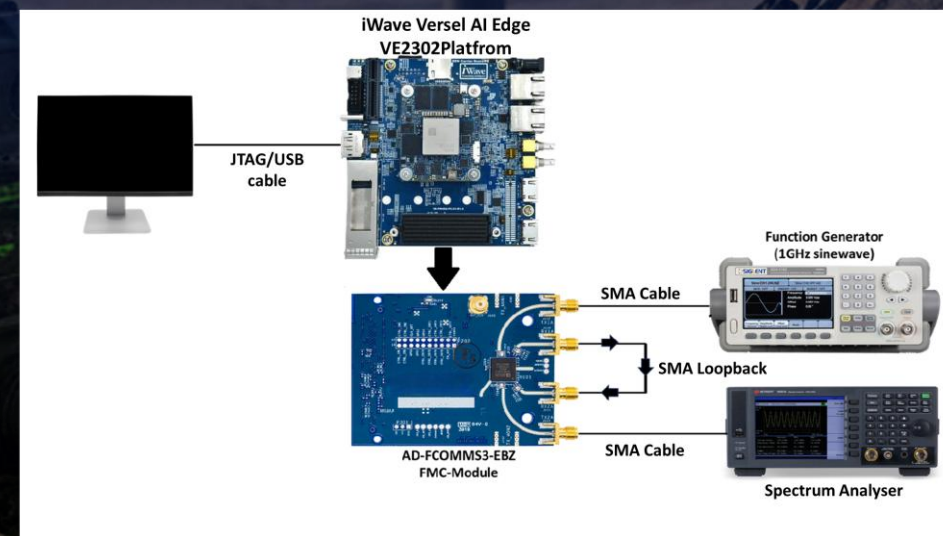
Wireless Radio Versal AI Edge VE2302 System on Module

Customer Background

The customer is a leading U.S. defense technology company specializing in autonomous systems, AI-enabled mission command software, and advanced defense platforms for national security applications. They develop hardware-software systems for wireless communications and software-defined radios in mission-critical environments, serving government and allied defense agencies with cutting-edge autonomous and AI-driven capabilities.

iWave Scope of Work

iWave supplied the customer with Versal AI Edge VE2302 System on Modules and associated development kits tailored for wireless radio and SDR applications, addressing high-performance processing and real-time data requirements. A custom carrier card was engineered to meet specific interface needs, and iWave provided comprehensive BSP, driver support, and lifecycle software maintenance. The engagement also included long-term production partnership planning to support scaled deployment of a few hundred units annually.



Industrial Process Application

Versal AI Edge VE2302 System on Module

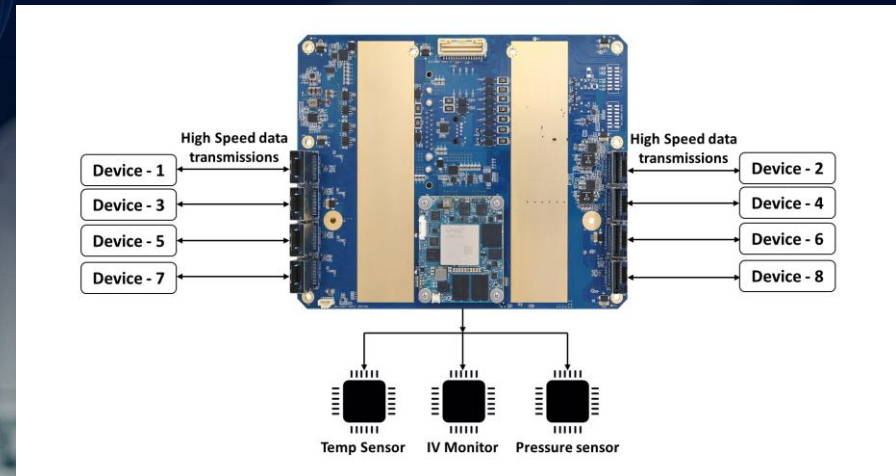
Case Study

Customer Background

Customer is engaged in the development of a specialized optical, mechanical, and electronic system used in advanced industrial process applications. The system architecture relies on a centralized master processor to manage system control, interface handling, and real-time data processing while continuously monitoring critical operational parameters. The application demands reliable operation, deterministic performance, and seamless integration with multiple independent peripheral subsystems.

iWave Scope of Work

iWave supplied the Versal AI Edge VE2302 System on Module as the core processing platform and designed a custom carrier board to interface the SoM with the customer's specified internal and external system interfaces. iWave supported seamless integration within the customer's master system processor architecture, assisted with system bring-up and functional validation, and delivered a scalable, modular hardware solution aligned with the customer's industrial deployment requirements.



Resources

Technical Articles

- [Article – Replacing Multi-Chip RF Architectures with a Single Versal™ RF Series SOM](#)
- [Press Release – iWave Introduces Versal™ RF Series SoM featuring Integrated AIE](#)
- [Article – The Rise of Single-Chip Intelligence in Edge AI Systems with Versal™ AI Edge Gen2](#)
- [Press Release – iWave Expands Versal Adaptive SoC portfolio with Versal™ AI Edge Gen2 SOM](#)
- [Article – Versal AI Edge XQRVE2302 SOM: For Satellite and Lunar Missions with Onboard AI Compute](#)
- [Press Release – Space-Ready Versal™ AI Edge XQR SOM for Next-Gen Satellite Applications](#)
- [Article – Unlocking High-Speed Connectivity: CPM5 Gen5 PCIe on iWave's Versal Premium Platform](#)
- [Article – Vitis AI NPU on VE2302 Versal AI Edge Boards from iWave](#)
- [Article – LLM Acceleration on Versal AI Edge: Brought to you by RaiderChip and iWave](#)

Videos

- [Demo Video: Accelerating the MIPI CSI & DSI demo on the iWave Versal AI Edge VE2302 SoM](#)
- [Demo Video: ADI AD9361 RF Transceiver on iWave Versal AI Edge & Zynq MPSoC DevKit | Wideband SDR](#)
- [Demo Video: Gen-AI LLM Acceleration on Versal AI Edge VE2302](#)
- [Demo Video: Accelerating AI at the Edge Vitis AI NPU demo on Versal AI Edge VE2302](#)
- [Overview Video: Inside the Industry's Smallest Versal AI Edge SoM](#)

Thank You

We are here to

Accelerate Embedded Innovation

mktg@iwave-global.com

INDIA | USA | GERMANY | EUROPE | TAIWAN | KOREA | JAPAN | DUBAI