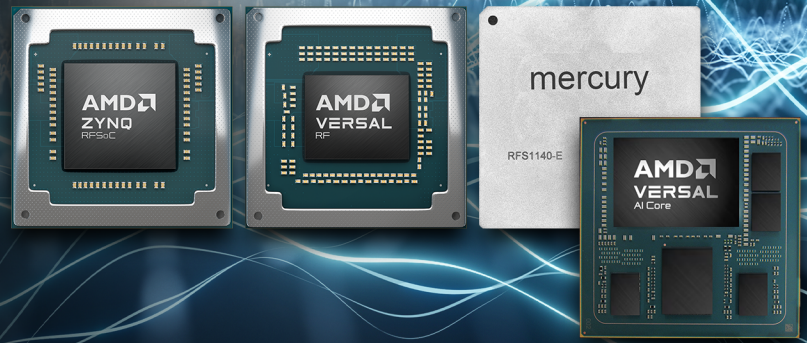


ADDRESSING WIDEBAND SPECTRUM COVERAGE WITH AMD HIGH-PERFORMANCE RF CONVERTERS & COMPUTE



together we advance_



OVERVIEW

The demanding challenges posed by a congested and contested spectrum are driving a need for direct sensing and processing across an increased range of RF bandwidth. This requires improved data converters with higher sample rates coupled with enhanced signal processing with greater compute per watt. AMD and Mercury Systems adaptive solutions cater to the wideband spectrum for electromagnetic spectrum operations (EMSO) applications.

AMD ZYNQ™ ULTRASCALE+™ RFSoc

As the first single-chip solution integrating RF sampling and programmable logic, the Zynq UltraScale+ RFSoc family is ideal for phased-array radar, communications, and signal intelligence systems. This integration enables optimal transmit and receive times, ensuring low-latency performance for applications in the L, S, and C bands.

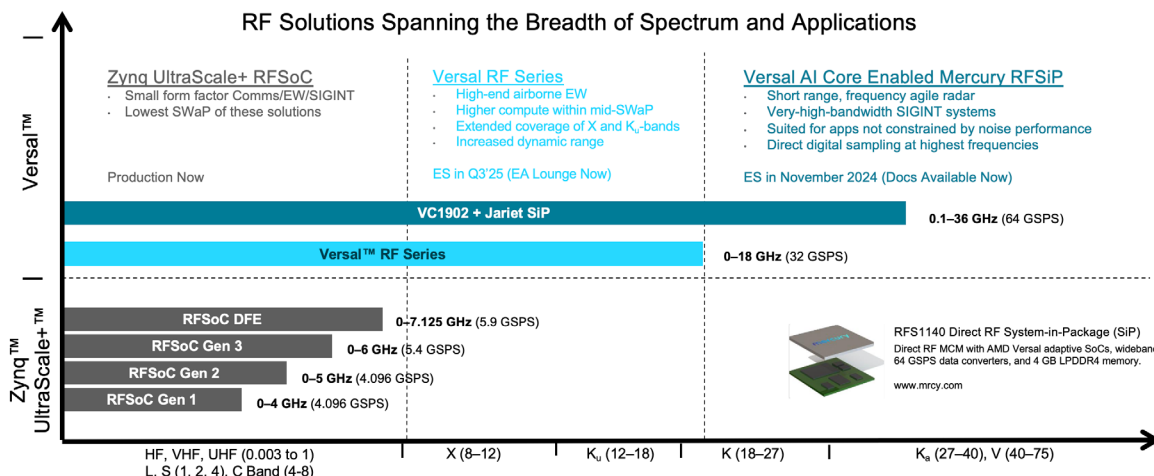
AMD VERSAL™ RF SERIES

Evolving from the Zynq UltraScale+ RFSoc family, the AMD Versal RF Series combines integrated data converters with hard IP blocks and Versal AI Engines, enabling flexible and precise signal analysis over a wide spectrum for advanced signal processing applications. This solution significantly reduces the need for programmable logic utilization and power consumption, which is optimal for SWaP constrained, mission-critical requirements.

MERCURY SYSTEMS RFS1140 RFSiP

The RFS1140 RFSiP has been jointly developed by AMD and Mercury, integrating AMD Versal AI Core Series with discrete data converters into a single heterogeneous package. The RFS1140 combines direct RF signal processing with high bandwidth and advanced DSP compute in a small form factor. By streamlining design complexities, it enables capabilities in communications, radar, and EW applications, paving the way for more efficient and powerful systems.

AMD RF PRODUCT LANDSCAPE



AMD producing Direct RF devices since 2017

KEY FEATURES

Extending across multi-generations of proven RF expertise, the AMD Zynq UltraScale+ RFSoc and Versal RF Series along with the Mercury Systems RFS1140 RFSiP address the full range of advanced RF applications from DC up to K_a-band and sample rates as high as 64 GSPS with integrated RF-sampling converters, achieving small form factors required for devices with significant signal processing compute.

ZYNQ ULTRASCALE+ RFSoc

- Integrated RF-ADCs and RF-DACs, up-to 14-bit resolution, RF-ADC sample rates, up to 5.9 GSPS with 7 GHz bandwidth, and RF-DACs up to 10 GSPS for simplified RF signal processing
- Dedicated hard SD-FEC cores paired with high DSP density
- Quad-core Arm® Cortex®-A53 and dual-core Arm Cortex-R5F processors with programmable logic, enabling real-time control and monitoring
- Optimized for SWaP-sensitive systems with moderate bandwidth and low latency requirements

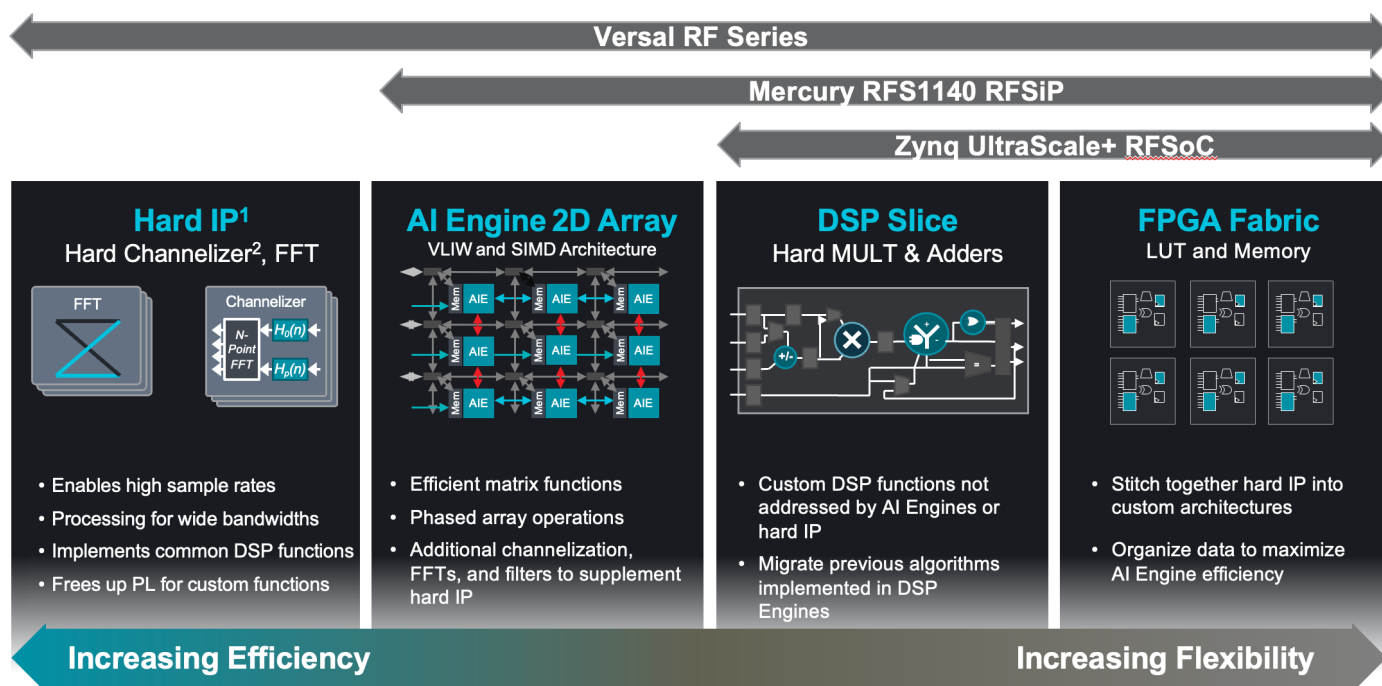
VERSAL RF SERIES

- 4th generation RF capability with 32 GSPS RF-ADC sample rate at 14-bit resolution and 18 GHz of analog bandwidth at -3 dB, the highest resolution RF-ADC sample rate monolithically integrated with adaptable logic,¹ supporting full 16 GHz IBW for 8 channels at 32 GSPS each, simultaneously
- Heterogeneous fabric integrating dual-core Arm Cortex-A72 application processor and dual-core Arm Cortex-R5F real-time processors, programmable logic, and Versal AI Engines for real-time DSP computations and deterministic performance
- Hard signal processing blocks implement FFTs, FIRs, polyphase channelizers, and LDPC decoding, combined with AI Engines and DSP58s to provide up to 80 TOPS of CINT16 signal processing capability (up to 10 TOPS of CINT16 per channel for 8x 32 GSPS)
- Integrated Versal AI Engines capable of complex algorithms to accelerate real-time spectral analysis
- Versal RF VR19xx devices offer the highest level of direct RF monolithic DSP compute on the market²
- High-throughput data offload with up to 1 Tb/s+ of bandwidth, support for PCIe® Gen5x4 and multiple 100/200/400G Ethernet MACs

RFS1140 RFSiP

- RF discrete converters with four channels of 64 GSPS Tx/Rx RF-ADCs and RF-DACs with 10-bit resolution (12-bit with calibration)
- Enabling up to 36 GHz of usable analog bandwidth, with 6.4 GHz IBW per channel, with response flatness and -3dB relative, and variable depending on BW region of interest and usage
- Integration of the VC1902 with 400 AI Engines and 1,968 DSP58s, providing more than 7 TFLOPs of FP32 or 20 TOPS of INT16
- System-in-package enabled with integrated 4 GB LPDDR4 and dual QSI nonvolatile memory for self-contained boot in package
- 300+ Gb/s of bandwidth for data offload, via PCIe Gen4 or Ethernet
- Same processor system and device architecture as the Versal RF Series, offering scalability for higher bandwidth applications

DSP COMPUTE FEATURES



NEXT STEPS

- Learn more about [Aerospace and Defense Solutions](#)
- Learn more about [AMD Versal RF Series Adaptive SoCs](#)
- Learn more about [AMD Zynq UltraScale+ RFSoc](#)
- Visit the [AMD Aerospace & Defense Platforms](#) page for more information on Mercury Systems RFS1140 RFSiP

ENDNOTES

1. Based on an AMD internal analysis, comparing the RF-ADC sample rate (GSPS) specification of the Versal VR1652 and VR1952 devices versus the published specifications of the Altera Agilex 9 Direct RF-Series AGRW014 and AGRW027 FPGAs and the pre-release design specifications of the ADI Apollo AD9084 and AD9088 devices. (VER-075)
2. Based on an AMD internal analysis comparing the theoretical processing capability (including hard IP, AI Engines, and DSP) of the Versal RF VR19xx devices versus the largest Altera Agilex 9 Direct RF-Series AGRW027 device. Results may vary based on device, configuration, design, and other factors. (VER-071)

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