AMD

XQR Space-Grade Kintex™ UltraScale™ and Space Heritage

AMD - THE ADAPTABLE INTELLIGENT COMPANY

Building on 20+ Years of Heritage.

From satellites to deep-space exploration, space missions must succeed in the most severe environments. Today, the worldwide trend for space electronics is having the capability for on-board processing also known as OBP, this allows systems to update in real time (eg. as protocols change the need to update algorithms becomes key). OBP has the potential to bring video on-demand, capacity growth, and convergence of ground and space networks. Traditionally, signal processing in space has been performed by Application Specific Integrated Circuits (ASIC) which are hardwired and not reconfigurable. Today protocols and applications can change rapidly and to keep up with the ever changing needs there is only one possible solution – a true on-orbit reconfiguration with AMD FPGAs.

AMD space-grade products are leading the aerospace industry to a new era of re-programmability and performance. The portfolio of rad-hard and rad-tolerant re-configurable FPGAs and configuration memories provide unmatched reliability, flexibility, density, and system level architectures that enable unparalleled design cycle and cost benefits for space systems.

AMD supports the broadest set of sub-segments and applications, covering ground-to-air-to-space applications. AMD rad-hard and rad-tolerant reconfigurable FPGAs give designers robust, qualified devices that can meet the performance, reliability, and lifecycle demands of space. Supported by AMD targeted design platforms, these programmable solutions deliver the AMD trademark value: shorter design times, lower costs, and greater flexibility compared to traditional implementations.

THE AMD DIFFERENCE IN SPACE

> Only On-Orbit Reconfigurable FPGA Solution

> Low Power Screened Devices

> Heritage with Multiple Successful Space Programs

> Footprint Compatible with Commercial Devices

> Support and Participation in the Xilinx Radiation Test Consortium (XRTC)

> Partner Investments for Kits & Solutions

> A&D Roadmap to New Solutions (RFSoC, Ruggedized, XQR)

AMD rad-hard and rad-tolerant FPGAs are robust— designed, packaged and space-grade qualified to meeting the performance, reliability and lifecycle demands of extreme environments, while enabling shorter design times, lower cost, lower program risk and greater flexibility than feasible with traditional ASIC implementations.

AMD IN SPACE

> Iridim Next

> Glonass-K

> NovaSAR

> Europa Clipper

> NISAR

> Europa Mission

XQR ARCHITECTURE PORTFOLIO

> XQR Kintex™ UltraScale

> XQR Virtex™ 5 FPGA

> XQR Virtex™ 4 FPGA

> Rad-Hard PROMs

THE ADAPTABLE ADVANTAGE

A&D contractors and government agencies, faced with several global economic shifts, are under more pressure than ever to create increasingly complex electronics systems. The AMD Targeted Design Platforms for A&D accelerates system development, for short cycles and lower costs, and gives developers full access to the flexibility and power of programmable devices. The V4QV product offers 4 different devices with a mix of DSP, BRAM, and logic cell counts from the DSP rich SX55 to the memory rich FX140 or the logic cell rich LX200. The V5QV device offers a great balance of DSP, memory, and logic resources while adding the PLLs and MGT transceivers in a 45x45mm CN1752 package.

RT KINTEX ULTRASCALE FIRST 20NM FPGA FOR SPACE APPLICATIONS

> **Adaptive Computing for Ultra High Throughput, High Bandwidth Applications**

- True Unlimited On-Orbit Reconfigurable Solution
- 10X DSP Compute capability for High Performance Applications
- Full Radiation Tolerance across All Orbits
- Machine Learning Suite for real time on-board-processing

> **Next Generation Space-Grade Kintex UltraScale Platform**

- AMD UltraScale features innovative design for SEU mitigation (> 40 patents)
- Deploys same commercial silicon mask set
- Utilizes Vivado UltraFast Development Advantage

> **Kintex UltraScale in Ruggedized 1509 Ceramic Column Grid Array (CCGA)**

- 45mm x 45mm package
- Footprint compatible with commercial A1517 package
- Military Temperature Grade & -1 Speed Grade

> **Product Space Test Flows**

- B-Flow (QML-Q Equivalent) & Y-Flow (QML-Y Compliant)
- Per MIL-PRF-38535 Revision K for ceramic non-hermetic packages
  in space applications, designated as Class Y
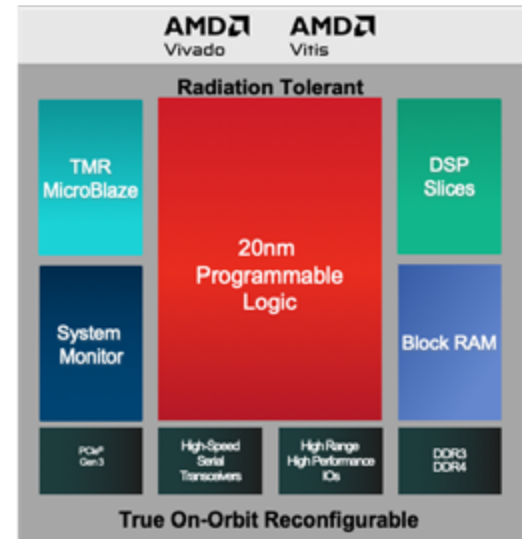
AMD'S FIRST ON-ORBIT ADAPTIVE V5QV FPGA

> Major Flight Heritage Since 2014 with the Iridium NEXT

> Radiation hardness built into silicon (RHBD)

> Dynamically adaptable digital logic FPGA for space environment processing needs

> Silicon functionality, IPs, radiation, reliability, tool chains all validated through extensive qualification tests and user testing

> QML-Y certification in process

> Lifecycle extended to 2030s

SPACE-GRADE VIRTEX-4QV FPGA

> V-Flow = QML-V Equivalent

> Identical to commercial silicon (same mask, same design)

> Latchup Immune

> Fabricated with EPI wafer for Latchup Immunity

> TID characterized, monitored & guaranteed

> SEU characterized

> Ceramic packaging

AMD

	XQR4V (RADIATION TOLERANT, 1.2V)				XQR5V (RH-BD, 1.0V)	RT KINTEX ULTRASCALE (RADIATION TOLERANT, 1.01V)
	SX55	FX60	F140	LX200	FX130	
Logic Cells	55,296	56,880	142,128	200,448	131,072	726,000
CLB Flip-Flops	49,152	50,560	126,336	178,176	81,920	663,360
Distributed RAM (Kbits)	384	395	987	1,392	1,580	9,180
Total Block RAM (Kbits)	5,760	4,176	9,936	6,048	10,728	38Mb
Max Distibuted RAM (Kb)	- -	- -	- -	- -	- -	9,180
Block RAM/FIFO w/ECC (36kb each)	- -	- -	- -	- -	- -	1,080
Digital Clock Manager (DCM)	8	12	20	12	12	- -
Phase Lock Loop (PLL)	- -	- -	- -	- -	6	12 CMT (1 MMCM, 2 PPLs)
DSP Slices	512	128	192	96	320	2,760
System Monitor	- -	- -	- -	- -	- -	1
PCI®e Gen1/2/3	- -	- -	- -	- -	- -	3
350 MHz PPC405 Cores	- -	2	2	- -	- -	- -
10/100/1000 EMACs	- -	4	4	- -	6	- -
Multi-Gigabit Transceivers (MGT)	- -	- -	- -	- -	18 @ 4.25Gbps	32 @ 12.5Gbps
TID (krad)	300	300	300	300	1,000	100
SEL Immunity (LETs)	>125	>125	>125	>125	>125	>80MeV
	Radiation Tolerant (RT)				Radiation Hardened by Design (RHBD)	Radiation Tolerant (RT)
Test Flows	V-Flow (QML-V Equivalent)				B-Flow (QML-Q Equivalent) V-Flow (QML-V Equivalent)	B-Flow (QML-Q Equivalent) Y-Flow (QML-Y Compliant)
Package — Size (mm)	35 x 35 mm		40 x 40 mm		45 x 45 mm	40 x 40 mm
Package — Pin Counts	1140	1144	1509		1752	1509
Package — Max. IO Count	640	576	768	960	840	620
Package — Daisy Chain	Yes	Yes	Yes		Yes	Yes

DISCLAIMERS

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