WHY XIPHOS COTS SPACE PROCESSING & SDR SOLUTIONS? DIFFERENTIATION

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AN EPIQ SOLUTIONS COMPANY

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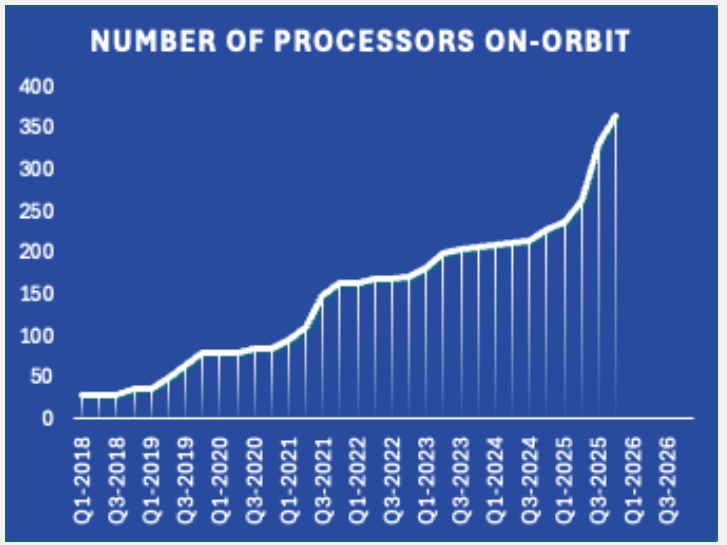
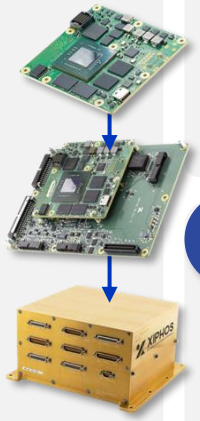
"I just want to…"

1. De-risk **Time to Launch**
2. Deploy **Newer** Technologies
3. Get Commercial **Scale**
4. Find a Partner I Can **Trust**



1. De-risk **Time to Launch**

- **Launch in months not years** using proven open-architecture system-on-modules, expanded functionality daughtercards or integrated solutions as your starting point
- **Standard daughtercards** include Attitude Control System, Data Storage and Interfacing, Optical Payload Processor, packaged On-Board Computer, SDR
- **Open architectures** including source code for Linux, FPGA etc.
- **Robustness designed into our architecture** – nobody has the IP, latch-up mitigation, robust boot, RDP that we do, developed over decades
- Get there faster and save budget using **the flexibility** of not starting from scratch – adapt what we have with the hooks that you need to customize as required.



2. Deploy **Newer** Technologies

- Compared to traditional SBC solutions, you get to deploy **newer technologies** such as Ultrascale+ and **Versal**, wrapped in our **reliability** and **mitigation techniques** honed over 20+ years.
- Rad tolerant, typically to 30krad TID, -40 to +60C

3. Get Commercial **Scale**

- We've worked with more than 150 customers across the globe. We **delivered 1,128 processors** in 2024-25 alone
- Cumulative time on orbit: 703 years since 2002

4. Find a Partner I Can **Trust**

- We're embedded in many of the world's **commercial constellations** such as Hawkeye 360, GHGSat, and EarthDaily; we're on **Government missions** from CSA, ESA, and NASA to DoD such as SDA Transport Tranche 0, 1, and 2, and **over 75% or our on-orbit customers are repeat customers**.
- Xiphos is a **Canadian owned division of the US Epiq Solutions** family, giving it extended expertise in RF and the ability to support US and international customers with flexibility.

CANADIAN SPACE AGENCY
AGENCE SPATIALE CANADIENNE
MDA
Synspective
NASA
esa
EarthDaily analytics
GHGSAT
ASTROBOTIC
HawkEye 360®

EXAMPLE APPLICATIONS

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B

A typical satellite is shown in this example, but Xiphos processors and SDRs are used in cubesats, SmallSats, large sats, launchers, landers, rovers etc.

Xiphos partners with flight software ecosystems, providing common mission-building blocks such as:

- Flight software
- RTEM support
- Onboard AI processing algorithms

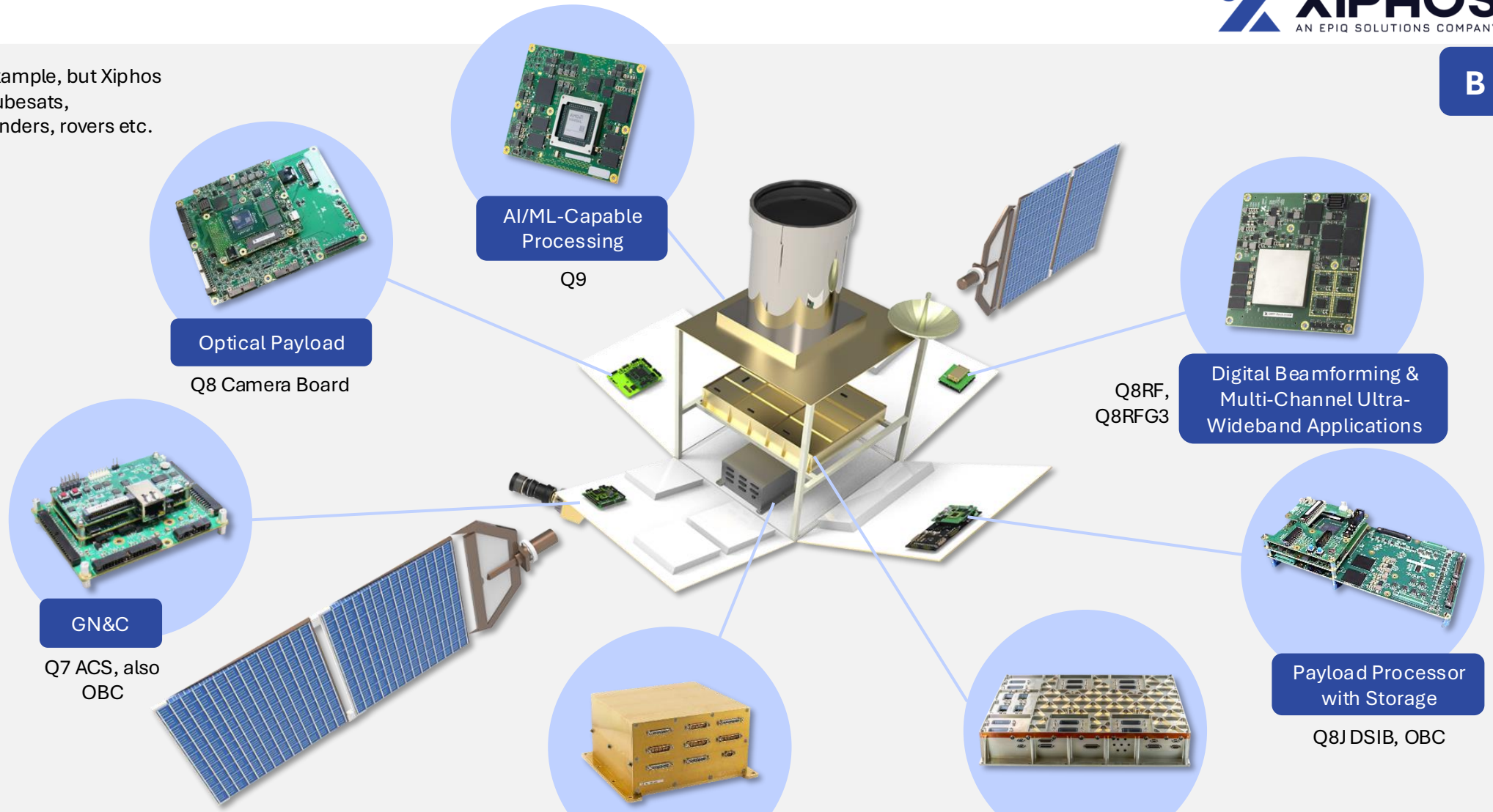
Partners include:

bright ascension

ROCKETLAB

ZAITRA

embedded brains



XIPHOS SPACE PROCESSING PRODUCTS

Increasing processor power →

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C

Processor Cards

Processor Card with Standard Daughter Boards

Integrated Solutions

Increasing customization/ functionality ↓

Q7 Ultra-Low SWaP Processor

Often used for OBC, image processing, signal processing, & control applications, such as imaging, visual inspection, & autonomous navigation.

- **Processor:** Zynq 7020 SoC
- **Memory:** 1 GB DRAM, 256 MB Flash, 2x SD to 32 GB ea.
- **I/F:** GbE, USB, CAN, GPIO, RS-XXX
- **TRL9**: Yes, since 2016

Q8 Low SWaP Computer-on-Module

Often used for demanding applications such as radar, satellite comms, high resolution image processing, and scientific research.

- **Processor**: Zynq Ultrascale+ ZU7
- **Memory**: 4 GB DRAM, 512 MB Flash, 256 GB eMMC
- **I/F**: GbE, USB, GPIO, hi speed IO lines
- **TRL9**: Yes, since 2020

Q8J Low SWaP with GTH Computer-on-Module

Builds on the Q8 by adding interfaces such as JESD204B for applications including interfacing with software-defined radios (SDRs).

- **Processor**: Zynq Ultrascale+ ZU7
- **Memory**: 4 GB DRAM, 512 MB Flash, 256 GB eMMC
- **I/F**: GbE, USB, GPIO, hi speed IO lines
- **TRL9**: Yes, since 2023

Q8RF/ Q8RFG3

SDR

First/ third generation RFSoC devices enabling direct sampling of RF. Gen 3 has improved RF specs & allows synch across boards for digital beamforming.

- **Processor:** ZU28/ ZU48 RFSoC
- **Memory**: 4 GB PS, 4 GB PL, 512 MB Flash, 64 GB/ 256 GB
- **I/F**: LVDS, GPIO, GTY for PCIe/ 100 GbE
- **TRL9**: Not yet, in 2026/ Not yet

Q9 Versal Computer-on-Module

First time a Versal-based platform has been available in such a small form-factor. Ideal for development of the next gen. intensive AI/ML applications.

- **Processor**: Versal AI Core
- **Memory**: 16GB, 2 TB SSD, 1 GB MRAM
- **I/F**: GPIO, GTY Qty 2 10/25/40/100G MRMAC
- **TRL9**: Not yet

Q7 ACS - Attitude Control System

Generally used as an ACS computer or as a satellite platform's Onboard Computer (OBC).

- Compute specs same as Q7
- **I/F**: GbE, Many RS-422, 485, GPIO, Magnetorquer drive, switchable 5, 15, 28V outputs, etc.
- **TRL9**: Yes, since 2023

Q8 Optical Payload Processor

Ideal for high-performance image processing. Often used in remote sensing and Earth observation applications.

- Compute specs same as Q8
- **I/F**: Base, Medium CameraLinks, RS-XXX, GPIO, LVDS GPIO, GPO etc.
- **TRL9**: Yes, since 2022

Q8J DSIB – Data Storage & Interface Board

DSIB provides a wide range of high-speed and standard interfaces and extensive mass storage.

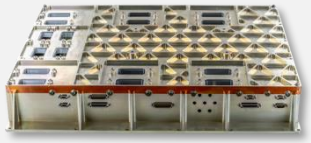
- Compute specs same as Q8J
- **Adds** 2x 1 TB SSDs
- **I/F**: GbE, CAN, RS-XXX, many LVDS
- **TRL9**: Yes, since 2025

Q8 OBC – On-Board Computer

Designed for demanding SmallSat missions, giving full control over all spacecraft subsystems. Many analog & digital interfaces.

- Compute specs same as Q8
- **I/F**: Many, including comms, analog, temperature, camera, RS-XXX, configurable LVDS
- **TRL9**: Yes, since 2025

Custom Solution



High volume payload with multiple processors in one chassis enabling 150 Gb/s of continuous raw image processing & streaming.

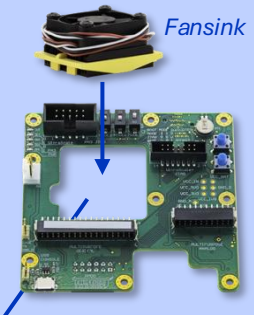
TRL9: Yes

Notes:

- TRL9 means it's flown already
- Typical temp specs -40 to +60 °C
- All Q-Cards qualified to 30krad TID except Q7 (25krad)
- Latch-up protection validated on all Q-Cards during Proton SEE qualification

Developing with Xiphos COTS Products

Faster to launch leveraging an open-architecture system-on-module with optional accessories to speed bench development. If a standard daughter board is not quite right, design your own with exactly the interfaces optimized for your mission.

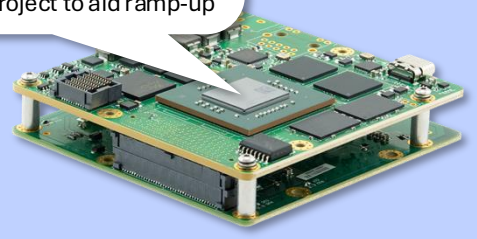


Standard Product Interface Module (PIM) sits on top for development

Open Environment:

- Open Linux image with source code based on Yocto
- Open FPGA environment including interfaces & drivers & source code with no per-seat licensing
- Skeleton Vivado project to aid ramp-up

Example daughter board sitting below the Q8



Interface cables, power supply

SPACE COMPUTING PRODUCTS - RELATIVE PERFORMANCE

There are many attributes and trade-offs when comparing performance between computing platforms. These graphs give an idea of how the different models compare to each other.

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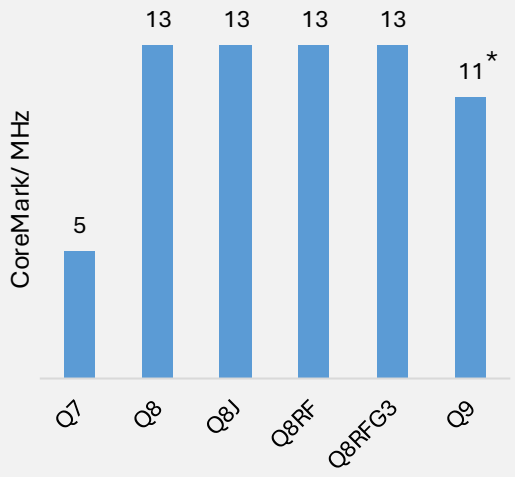
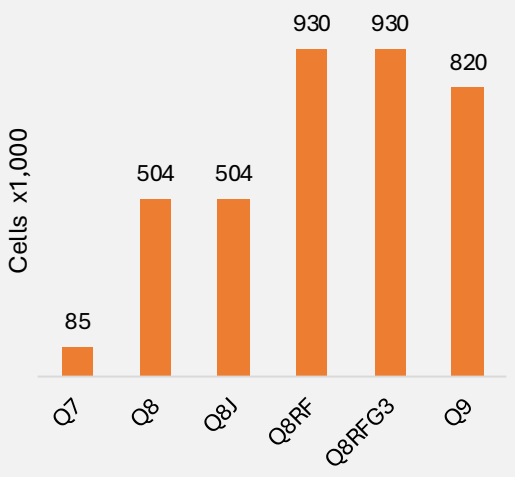
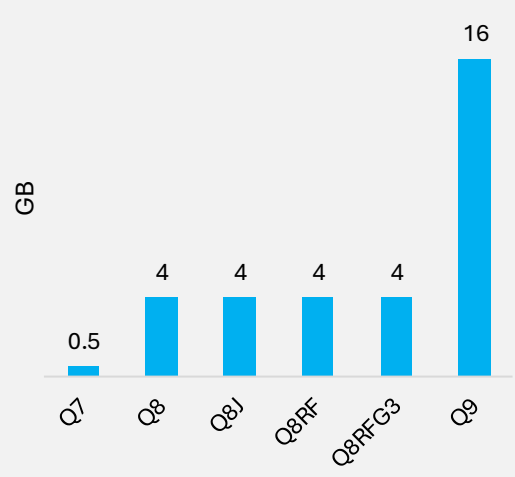
Benchmark CPU Performance



FPGA Logic Cells (K)



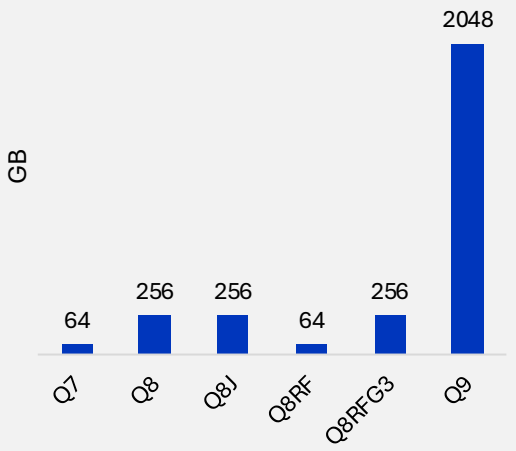
PS RAM w/ECC (GB)



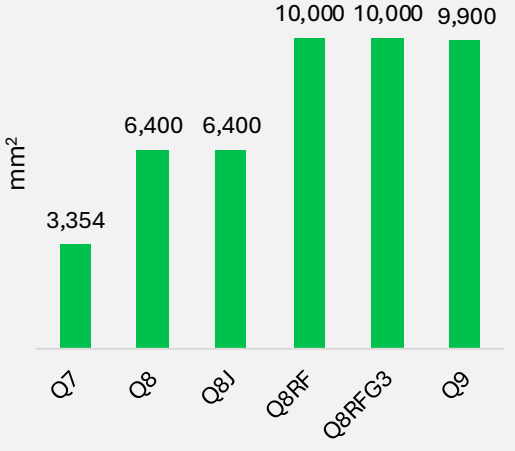
Q7 Background

The baseline Q7 is no laggard in its own right – there are more than a hundred in orbit doing the heavy lifting as the flight computer or other similar tasks. With very low SWaP, it delivers more performance than a typical microprocessor and allows on-orbit image updates and recovery of corrupt images. It has a supervisor FPGA which even allows troubleshooting & recovery on-orbit.

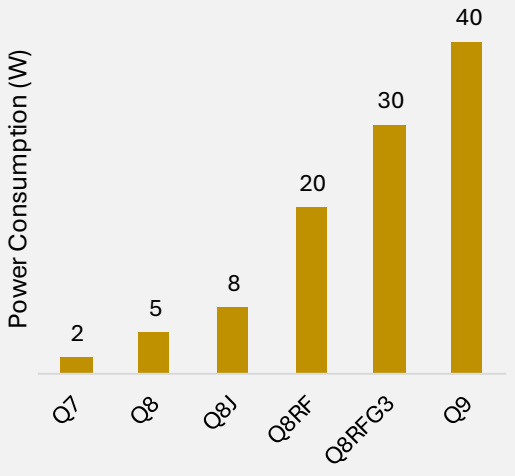
Storage (GB)



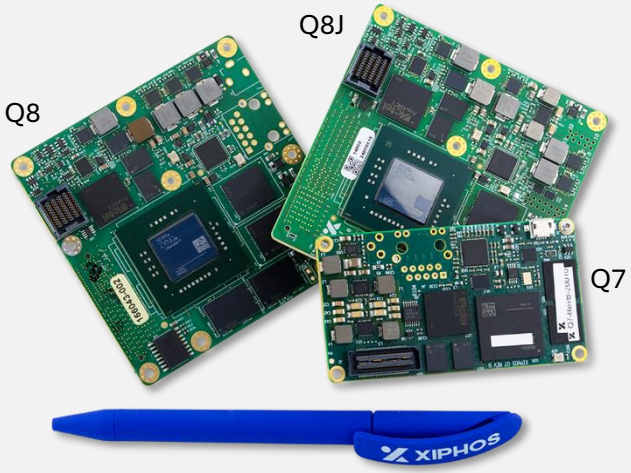
Floorplan Size (mm^2)



Nominal Power (W)



Relative Sizes



* The Q9 A72 supports out of order execution, larger cache, and faster clock speed etc.