

Lower Barriers for Space Commercialization and Exploration with Microchip COTS Rad Tolerant



A Leading Provider of Smart, Connected and Secure Embedded Control Solutions

ALTER | 

ACCEDE | ESCCON

2025

Seville - Spain
25 to 27th March



Lower Barriers for Space Commercialization and Exploration with Microchip COTS Rad Tolerant

- **Microchip in Europe : Products & Competencies for Space**
- **Space Commercialization & Exploration Challenges**
- **Scalable Solutions for Space Applications**
- **Latest Microchip COTS Rad Tolerant devices**

Microchip's Broad Portfolio & Market Coverage

1 Semiconductor Supplier in Aerospace and Defense

Complimentary Product Lines

MCUs	FPGA	Memory	Interface	Analog	Mixed Signal	Power Management	High Rel Discrete
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A&D Dedicated Group



A&D Product Lines in Europe



- **ADG France**
 - Processors and Microcontrollers
 - Com Interfaces and Memories
 - ASIC Mixed Signals
- **DPG France**
 - Power Modules
- **DPG Ireland**
 - Hi-Reliability Discrete
 - Power Modules
- **Vectron Germany**
 - Oscillators
 - RF SAW Filters
- **RF Microwave UK**
 - Amplifiers
- **Advanced Packaging UK**
 - Size, Power and Reliability



Nantes, France



Rousset, France



Bordeaux, France



Ennis, Ireland



Teltow & Neckarbischofsheim, Germany



Belfast, UK

Microchip ADG France

Aerospace and Defense Product Line

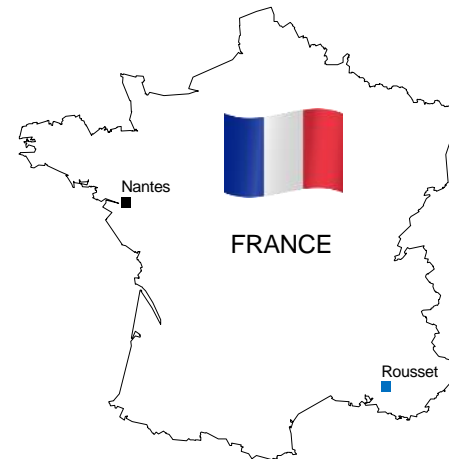
- **Committed to High Reliability and Long-Term Supply**
 - Delivering aerospace ICs for more than 30 years
 - Strong flight heritage in space and avionics applications
 - Leverage from automotive solutions for “new space” challenges: volume, cost and time to market
- **Major Product Focus**
 - Processors and microcontrollers
 - Communication interfaces and memories
 - Mixed Signal ASICs
- **Long-term Cooperation with European Agencies:**
 - ESA, CNES, DGA, DLR ...
- **Internal Qualified Supply Chain**
 - DLA/ESCC: Wafer lot to qualified parts (France)
 - DLA: Assembly line (Thailand)



Microchip Nantes - France



Microchip Rousset - France



Microchip MMT - Thailand



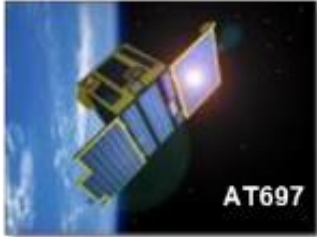
- Thailand



Processing: An Unrivalled Flight Heritage



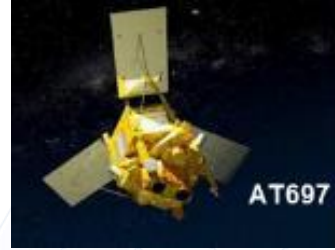
Colombus
2008



Proba2
2009



JUNO (Nasa)
2011



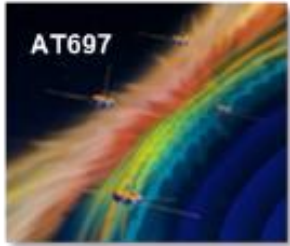
SPOT6
2012



Sentinels &
Alphasat
2013



SVOM/Eclair
2013



MMS (Nasa)
2014



Exomars
2016



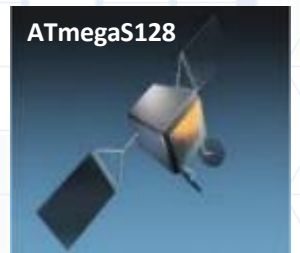
Solar Orbiter
2017



Bepi-Colombo
2018



Perseverance 2021



Mega Constellation
LEO Sat -2019



ASBM 2024



IRIDE 2025

Thousands of flight models
delivered worldwide



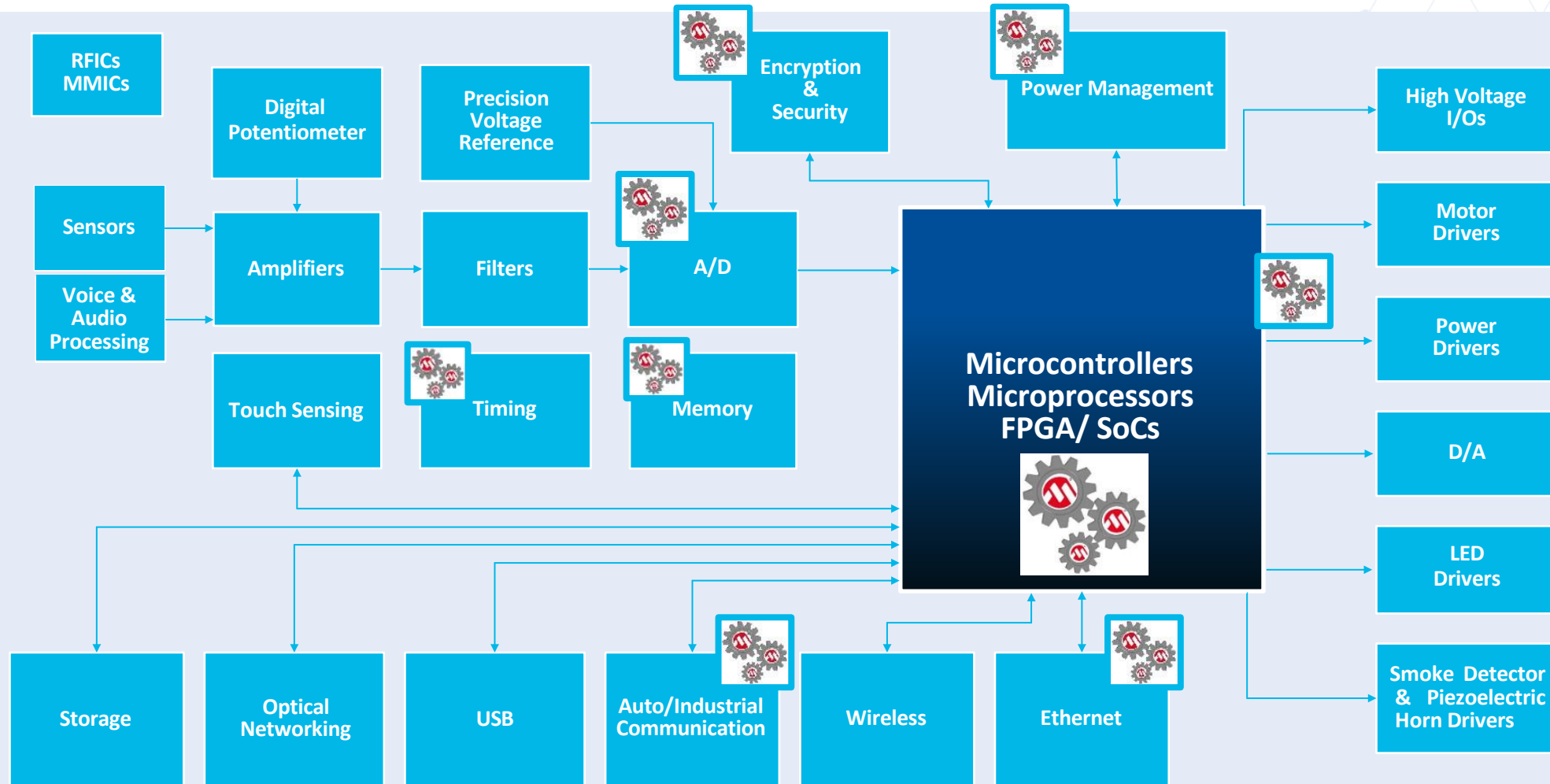
Capella Sequoia
Earth Obs 2020



ANGELS Nanosat
2020

Drive innovation around processing solutions

Ethernet, PCIe, CAN FD, Security, Digital Power, System Clocks, NVM, Mixed Analog ...



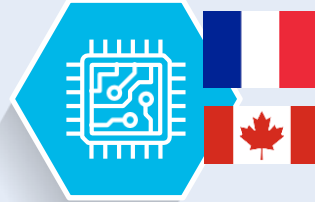
Long Product Lifetimes – Customer Driven Obsolescence

Space Products & Competencies in Europe



Connectivity

RF Modules & Microwave Solutions



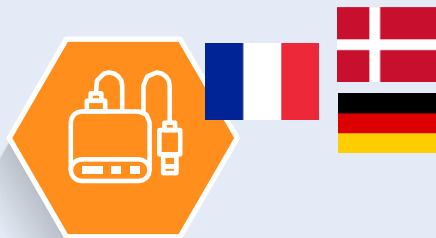
Processing

8, 32 & 64-Bit MCUs
Microprocessors
FPGAs



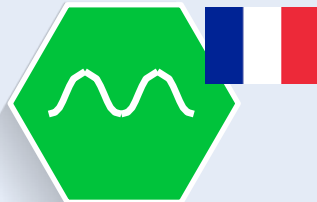
Clock & Timing

Cesium Clocks
Chip Scale Atomic Clock (CSAC)
Oscillators



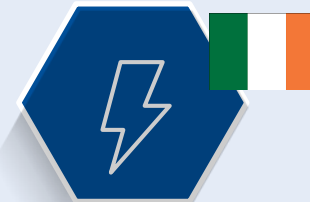
Interface & Connectivity

SpaceWire, Ethernet, CAN



Analog & Mixed Signal

Telemetry and Motor
Control System Managers
Power Supply protection



Power Management

Power Discrete: JANS Diodes, Bi-Polar SST,
MOSFETs
Isolated DC-DC Converter
Hybrids: Linear & POL
High Voltage Electromechanical Relays



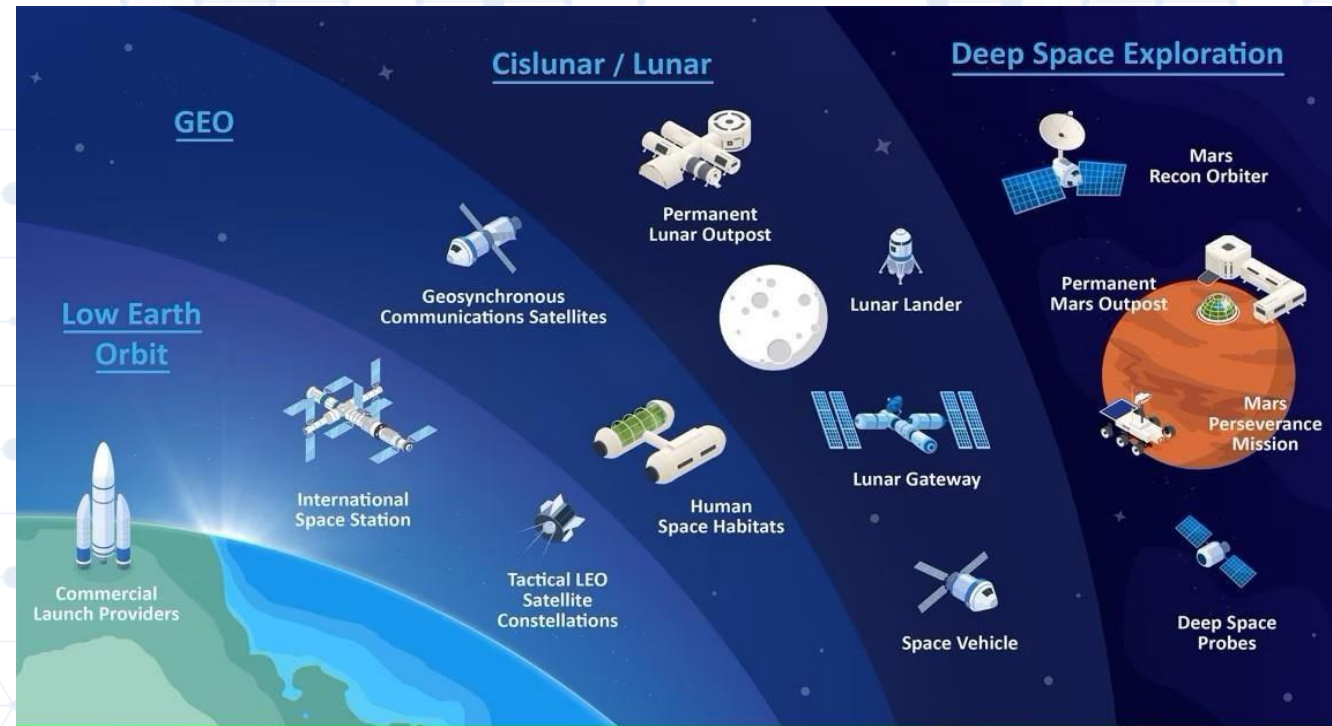
Memory & Storage

Serial & Parallel EEPROM
SRAM

New Challenges for Space Industry ...

... more than LEO constellations

- **Commercial Focus:** Private companies seek profits from satellite services, space tourism and mining resources
- **Cost Efficiency:** New Space emphasizes cost-cutting technologies, such as reusable rockets and more affordable satellites
- **Rapid Innovation:** With companies leveraging advances in software, reusing largely deployed technologies, materials science and miniaturization
- **Increased Accessibility:** Smaller companies and nations can now participate in space activities through shared resources, like ridesharing on rockets



Radiations Robustness & Reliability

Main Barriers That Still Influence Product Selection



- ❖ Destructive radiations effects : SEL, SGR, SEB, ...
 - ❖ Critical degradation along the time w TID
 - ❖ Extended temperature range
 - ❖ Environmental & material constraints
 - ❖ Long term availability & obsolescence management
 - ❖ End system qualification requirements
-
- Radiations Simulation & Tests Capabilities
 - Component & Design Knowledge
 - Supply Chain Traceability & Control for Low Volume
 - Advanced Qualification & Production Tests
 - High Quality Standard Management

Scalable Solutions for Space

Scalable solutions in Software, Hardware and Packaging, offering design reuse for a wide range of mission goals

- ◆ **From widely deployed industry standards**

Prototype your design with our Commercial-Off-The-Shelf (COTS) devices and upgrade to space-qualified versions for production

- ◆ **From our unrivalled flight heritage**

Sub-QML versions that combine the radiation tolerance of QML components with our space flight heritage to enable lower screening requirements for lower cost and shorter lead times

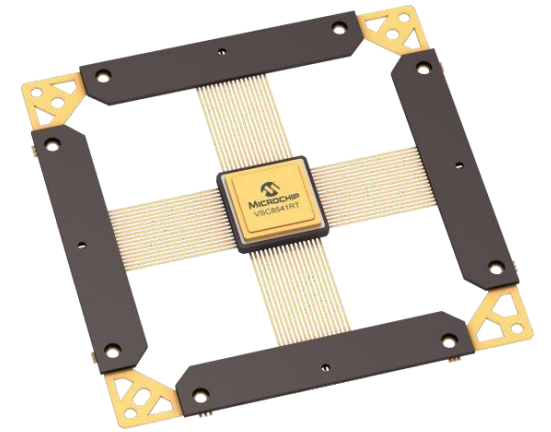
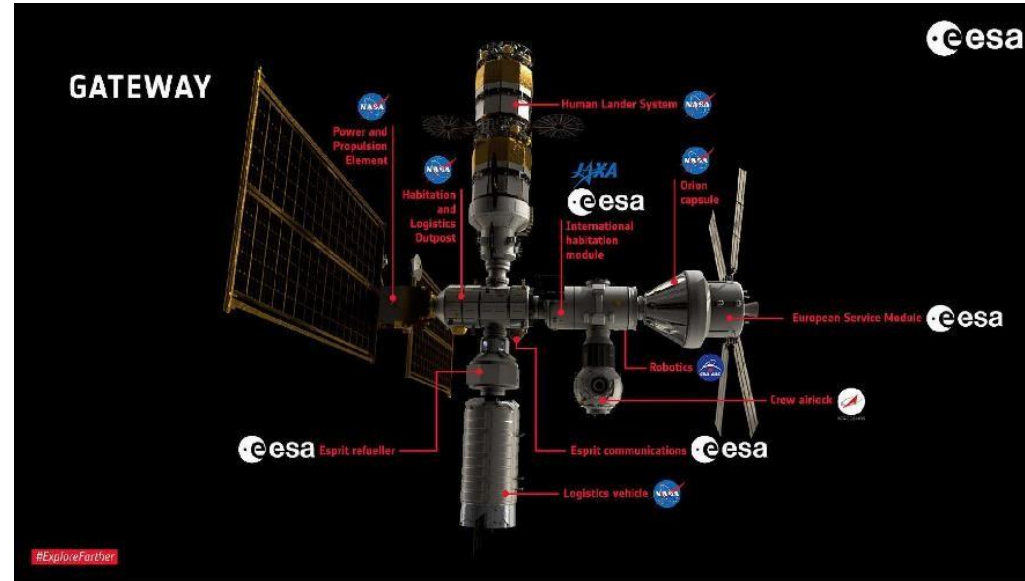
- ◆ **Customization**

Optimizations across many aspects of our manufacturing processes to fine tune for customer specific mission profiles



New Space : Moving to industry standards

Ethernet drives more innovation in Space Industry

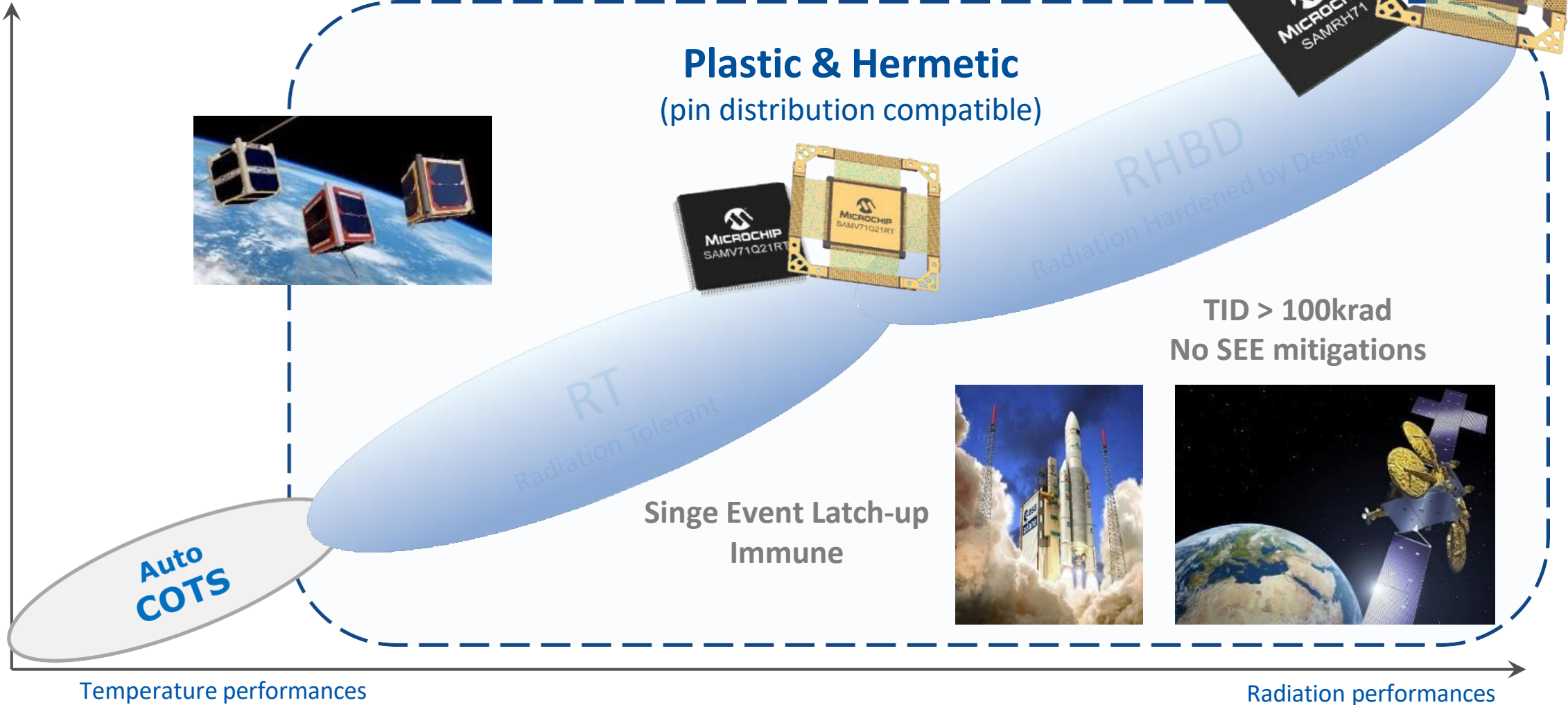


<https://www.microchip.com/en-us/product/vsc8541rt>

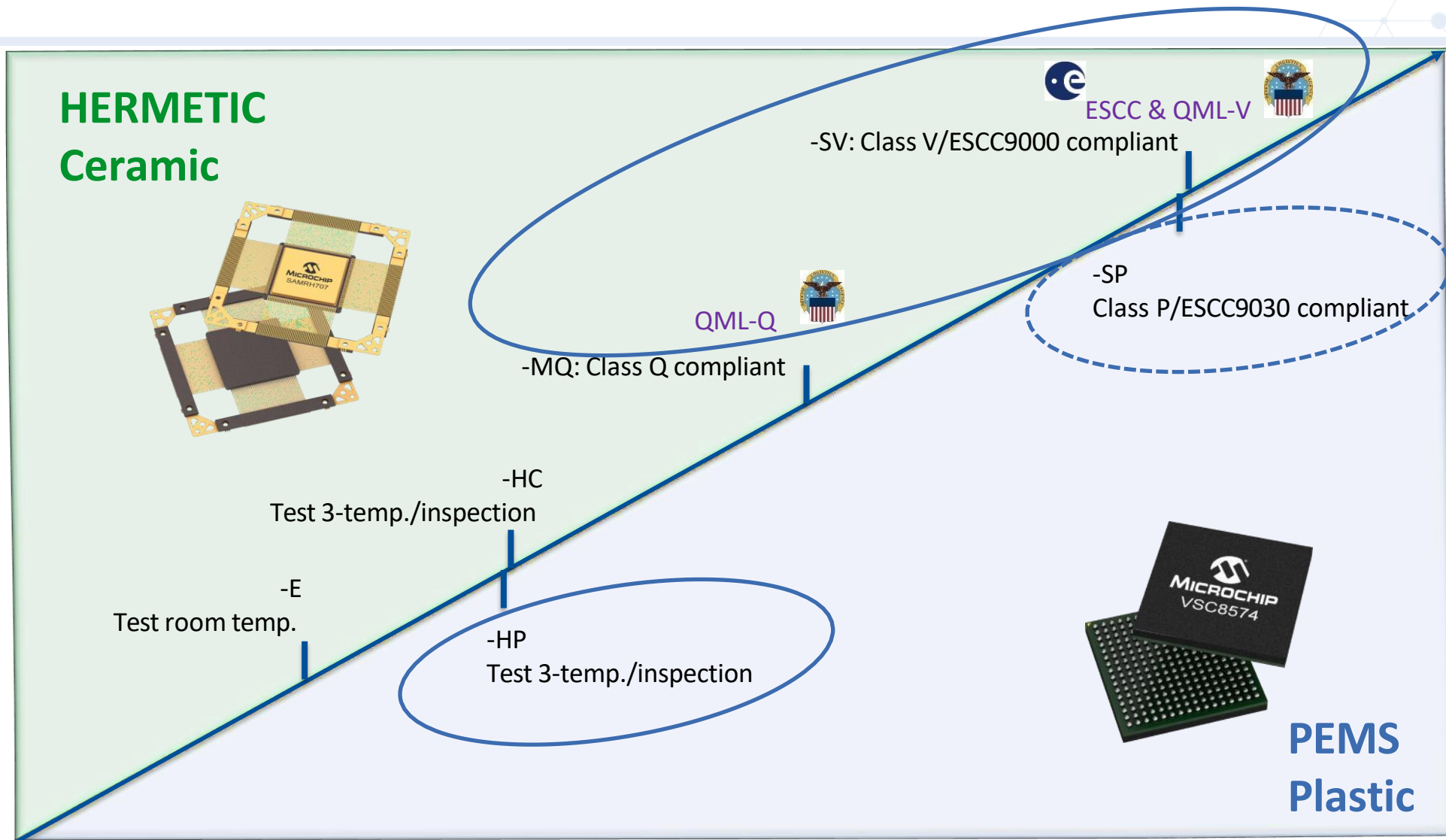
Already thousands of Space Ethernet PHY delivered by Microchip

From COTS to Space Qualified Solutions

Quality Grade



ADG France - Quality grades



Hirel Plastic vs COTS Automotive

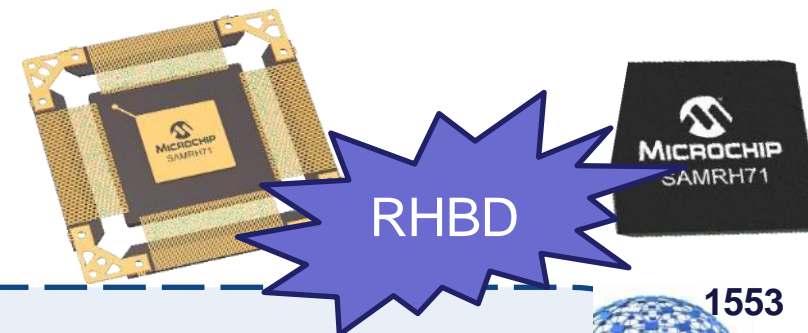
- Ensure **full traceability** : Single Fab & Assembly w Dedicated Wafers
- Access to « Single Lot Date Code »
- Extended temperature range -55/125°C*
- Low MOQ : hundred of units

- **Reliability** verified on the **full temperature range**
- Extended qualification : HAST, Life Tests, Temp Cycling ... => prod spec & CofC
- **Full access to Qualification Data** (Qual Pack)

- Extra screening options : burnin, T° cycling, ...
- **Extension towards QMLP – ESCC9030** standard qualification level

Arm® M7 SoC => COTS to RHBD

Unique Scalable Solution



Qualification Level ↑

Other aerospace applications

Auto COTS

SAMV71Q21		
Memory	Cortex-M7 300 MHz	System
Up to 2MB Embedded Flash	256 Kbytes	256 Kbytes 0 and 100 Kbytes 2 Warning
384 KB Main-Port SRAM	MPU	Backup SRAM - 1KB
Static Memory Controller	DSP / FPU	Voltage Regulator, POR
SRAM Controller	32x 16KB L2 Cache with ECC	
Connectivity	Control	Security
1x USB Device (HS)	114.5K	ADCS
1x USB OTG/DMAC	32x 16KB PWR On-Chip SRAM	Integrity Check Module (ICM)
5 UART, 3 I2C, 2 SPI, 1 TWI	32x 16KB L2 Cache with ECC	TRNG
1 CAN	32x 16KB L2 Cache with ECC	Memory Scrambling
2 CANFD	32x 16KB L2 Cache with ECC	
EMAC 10/100	32x 16KB L2 Cache with ECC	User Interface
		Control Center
		11 CSI, TRM

RT

SAMV71Q21RT		
Memory	Cortex-M7 300 MHz	System
Up to 2MB Embedded Flash	256 Kbytes	256 Kbytes 0 and 100 Kbytes 2 Warning
384 KB Main-Port SRAM	MPU	Backup SRAM - 1KB
Static Memory Controller	DSP / FPU	Voltage Regulator, POR
SRAM Controller	32x 16KB L2 Cache with ECC	
Connectivity	Control	Security
1x USB Device (HS)	114.5K	ADCS
1x USB OTG/DMAC	32x 16KB PWR On-Chip SRAM	Integrity Check Module (ICM)
5 UART, 3 I2C, 2 SPI, 1 TWI	32x 16KB L2 Cache with ECC	TRNG
1 CAN	32x 16KB L2 Cache with ECC	Memory Scrambling
2 CANFD	32x 16KB L2 Cache with ECC	
EMAC 10/100	32x 16KB L2 Cache with ECC	User Interface
		Control Center
		11 CSI, TRM

SAMV71Q21RT
600DMIPS
Latch-up Immune

2023

SAMRH71		
Memory	Cortex-M7 100 MHz	System
Up to 2MB Embedded Flash with ECC	256 Kbytes	2 Independent Warning POR, Voltage Regulator Monitor
384 KB Main-Port SRAM with ECC	MPU	2 1KB PWR SRAM
Static Memory Controller	DSP / FPU	32880 16Kb DRAM with 10240 16Kb DRAM with ECC
SRAM Controller	32x 16KB L2 Cache with ECC	32880 16Kb DRAM with 10240 16Kb DRAM with ECC
Connectivity	Control	Control
1x USB 2.0 HS, 1x USB 2.0 FS	114.5K	11 CSI, TRM
Dual CANFD	32x 16KB PWR On-Chip SRAM	Integrity Check Module (ICM)
Enhanced EMAC 10/100	32x 16KB L2 Cache with ECC	2x 16KB PWR SRAM
3x Security with RAMP, LMS, Trimmer	32x 16KB L2 Cache with ECC	Quad IOST
MC-20-100B	32x 16KB L2 Cache with ECC	Integrity Check Module (ICM)

SAMRH71
>200DMIPS
TID > 100krad

1553
esa
SpaceWire
2020

Temperature performances

Radiations performances



SAMD21J17RT

ARM Cortex M0+ Low End MCU

128KB Flash
16KB SRAM
52 GPIOs

Small package
QFP64

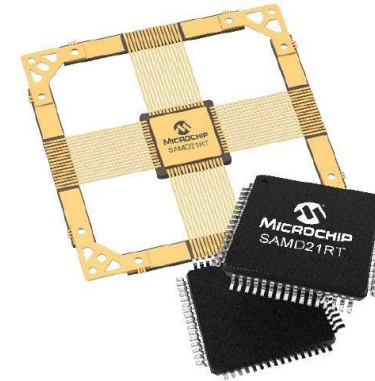
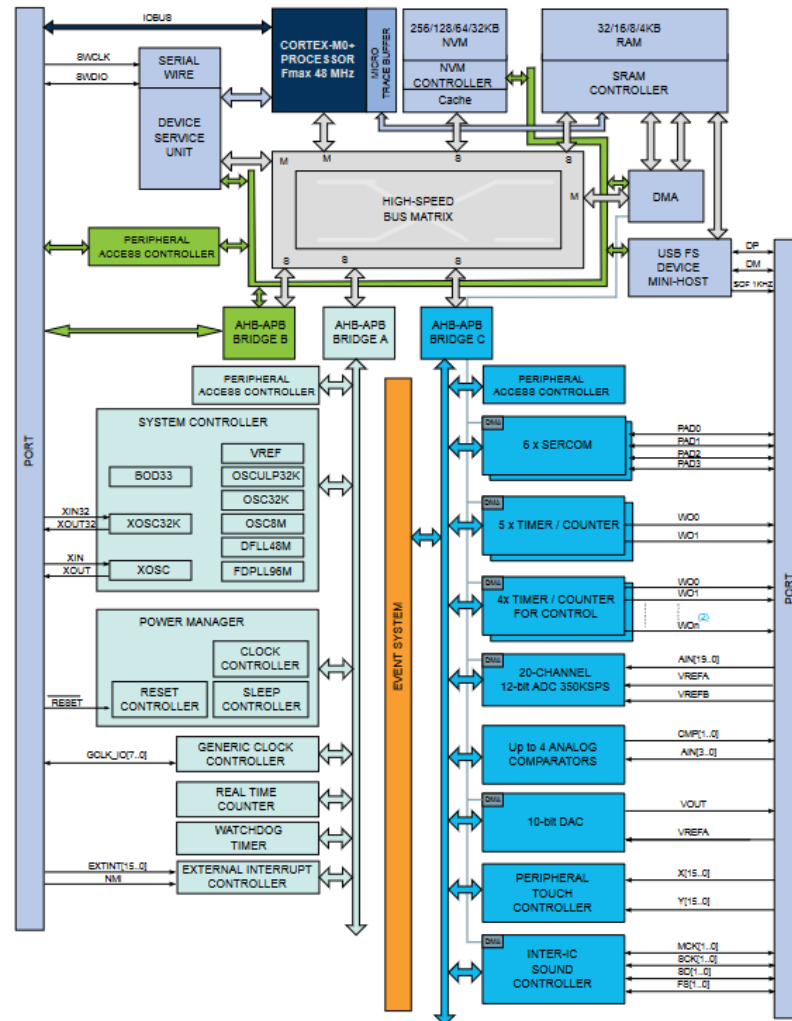
-40°C/125°C

3V to 3.6V

Radiation

TID >50Krad
SEL immune up to 78MeV

Samples and Flight Models Available



arm

~50 DMIPS

Hmatrix w DMA

350Ksps ADC, 12 bit
10bit DAC

14 PWM Motor Control
Analog comparator

SERCOM
6 UART/SPI/TWI

VSC8574RT



Rad Tolerant 4 Port GbE Cu/Fiber PHY with (Q)SGMII & IEEE1588

Samples and Flight Models Available

Radiation
TID 100krad
SEL immune up to 78 MeV

10/100/1000 Base-T copper, 100 Base-FX, 1000 Base-X fiber transceiver

4 ports

SGMII / QSGMII interface

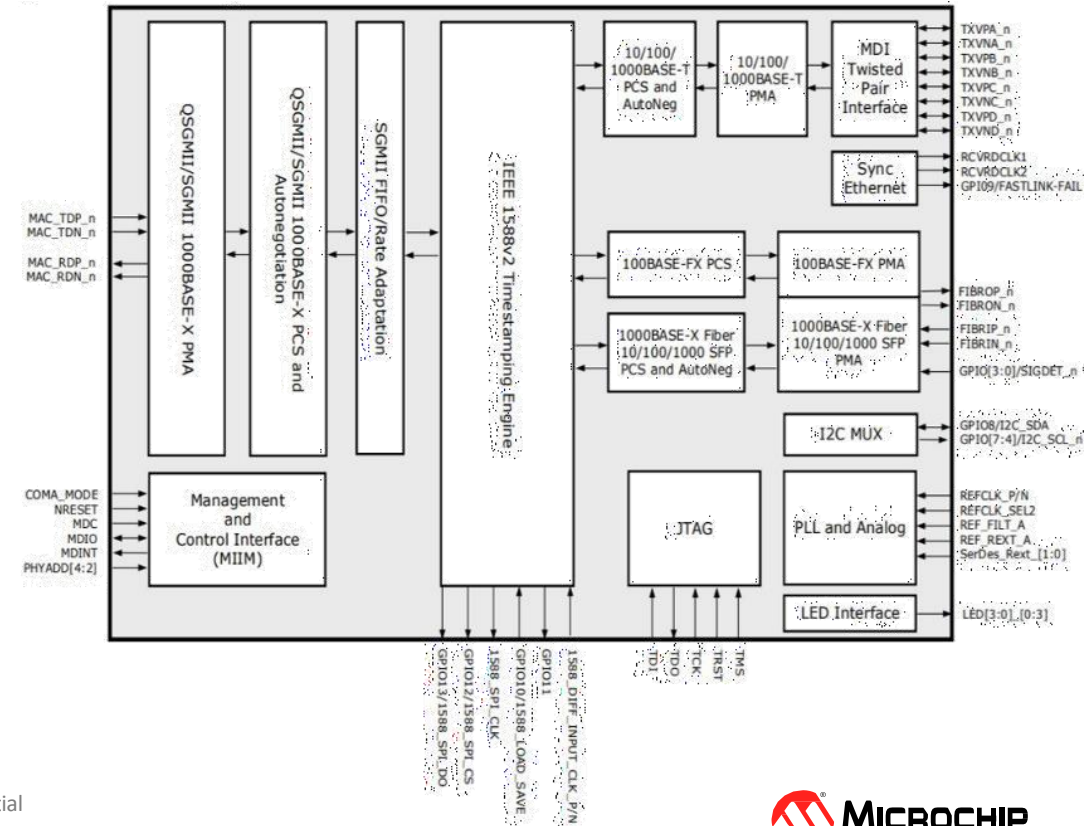
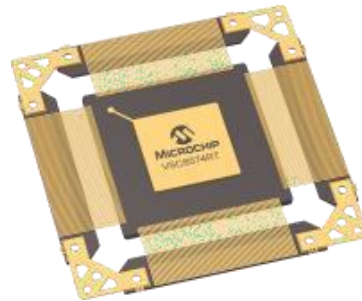
QSGMII 5 Gbps SerDes

IEEE 1588v2 High Accuracy (8 ns)

Dual Media

Extended temperature range -55°C to 125°C

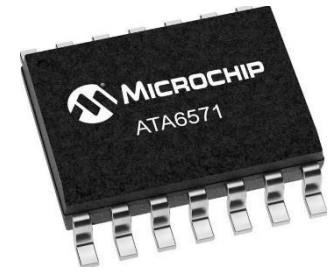
CQFP 256 and BGA 256 packages



ATA6571RT

ES Mid 2025, FM H1'26

Rad Tolerant CAN FD Transceiver – Unique European Source



CAN FD Transceiver with Communication Speed up to 5Mbit/s

- Remote wake-up pattern capability detection via CAN bus
- Low Electromagnetic Emissions and High Electromagnetic Immunity
- Functional Safety Documentation (Safety Manual & FMEDA)
- High Electrostatic Discharge (ESD) Handling Capability on the Bus Pins
- Bus Pins Protected Against Transients
- High voltage WAKE input pin
- INH- output to control an external voltage regulator
- VIO Input for Direct Interfacing with 3.3V and 5V Microcontrollers
- Various Diagnostic and Failsafe Features

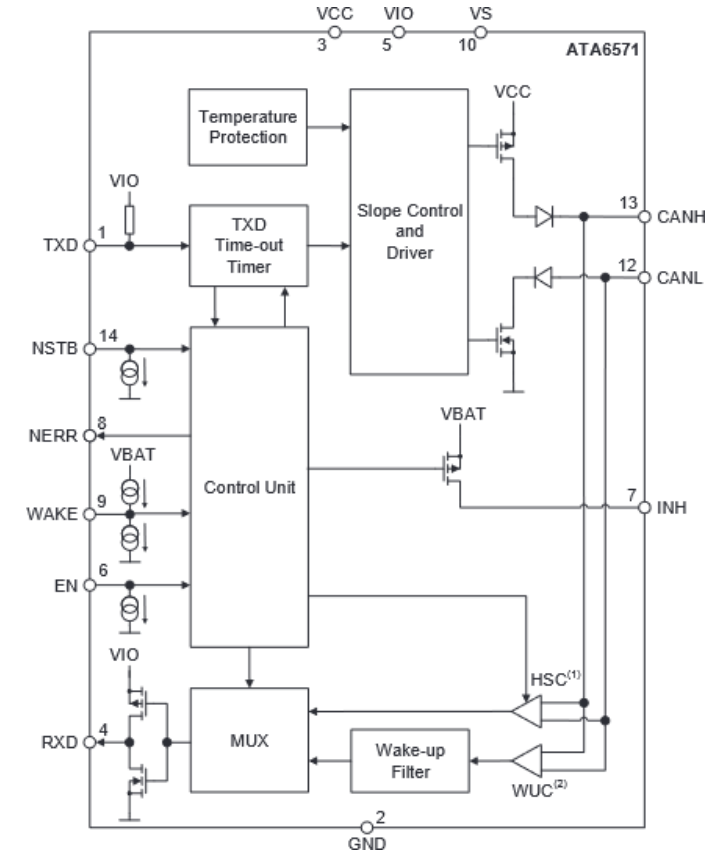
Packages

- Plastic SOIC-14
- Ceramic FP14

Temperature range: -55°C / +125°C

Radiation

TID >30Krad
SEL immune up to 78MeV

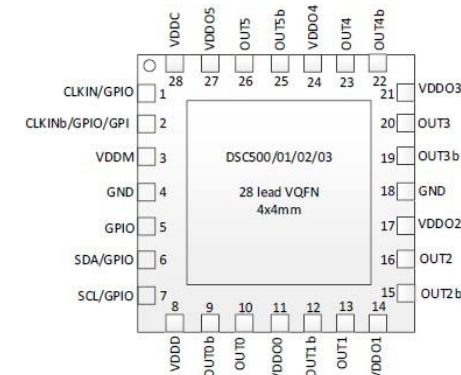
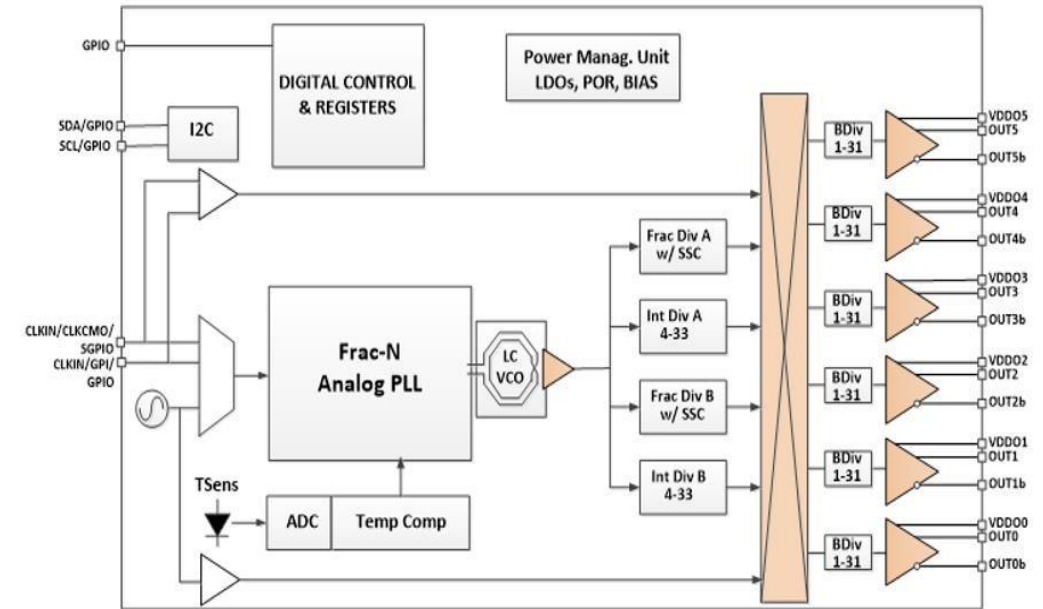


DS504RT - Clock Synthesizer for Space

6 Channels Clock Generator

ES H2'2025, FM H1'26

- 6 differential outputs or 12 CMOS output or a combination of both.
- Each output configurable in the range 10MHz / ~700MHz
- Input references:
 - Differential input clock (up to ~250MHz)
 - CMOS input (up to ~150MHz)
- Differential/Single ended External clock
- PCIe Gen1, Gen 2, Gen 3, Gen 4, Gen 5, SRIS compliant output
- 250fs jitter with external reference clock/oscillator
- I2C Access for configuration
- Military Temperature Range: -55°C to +125°C
- Radiation Performance : TID > 100kRad / SEL >62MeV
- Package : 28 pins plastic QFN / 28 pins Ceramic flat pack



New Space Product Announcements

PIC64-HPSC

[Microchip Unveils Industry's Highest Performance 64-bit HPSC Microprocessor \(MPU\) Family for a New Era of Autonomous Space Computing](#)

JANxx Transistors

[Microchip Adds Military-Standard Enhanced Low Dose Radiation Sensitivity \(ELDRS\) Qualification to Its Portfolio of Small-Signal Bipolar Junction Transistors to Ensure High Reliability for Critical Applications](#)

SAMD21RT

[Microchip Expands its Radiation-Tolerant Microcontroller Portfolio with the 32-bit SAMD21RT Arm® Cortex®-M0+ Based MCU for the Aerospace and Defense Market](#)

LE50-28

[Radiation-Tolerant DC-DC 50-Watt Power Converters Provide High-Reliability Solution for New Space Applications](#)

RT PolarFire® system-on-chip (SoC) FPGA

[Radiation-Tolerant PolarFire® SoC FPGAs Offer Low Power, Zero Configuration Upsets, RISC-V® Architecture for Space Applications](#)



Where to Learn More...

Web pages to access [Link](#)

- Products, Applications
- Reference designs on product pages
- Webinars and video, blogs
- Newsletters

Space Applications

Find the Right Solution for Your Space Application Design



Comprehensive Solutions for Space Applications

We offer a suite of use cases, evaluation cards, software IP and IDEs to accelerate your motor control, in-flight reprogramming and telemetry control designs.

[Explore Our Applications](#)



Scalable Products

We offer one of the industry's most comprehensive product portfolios for space applications, which includes radiation-hardened and radiation-tolerant products.

Our unique, scalable approach allows us to cover a wide range of quality levels with the same product. You can upgrade from COTS to QML of sub-screen from QML to high-reliability plastic.

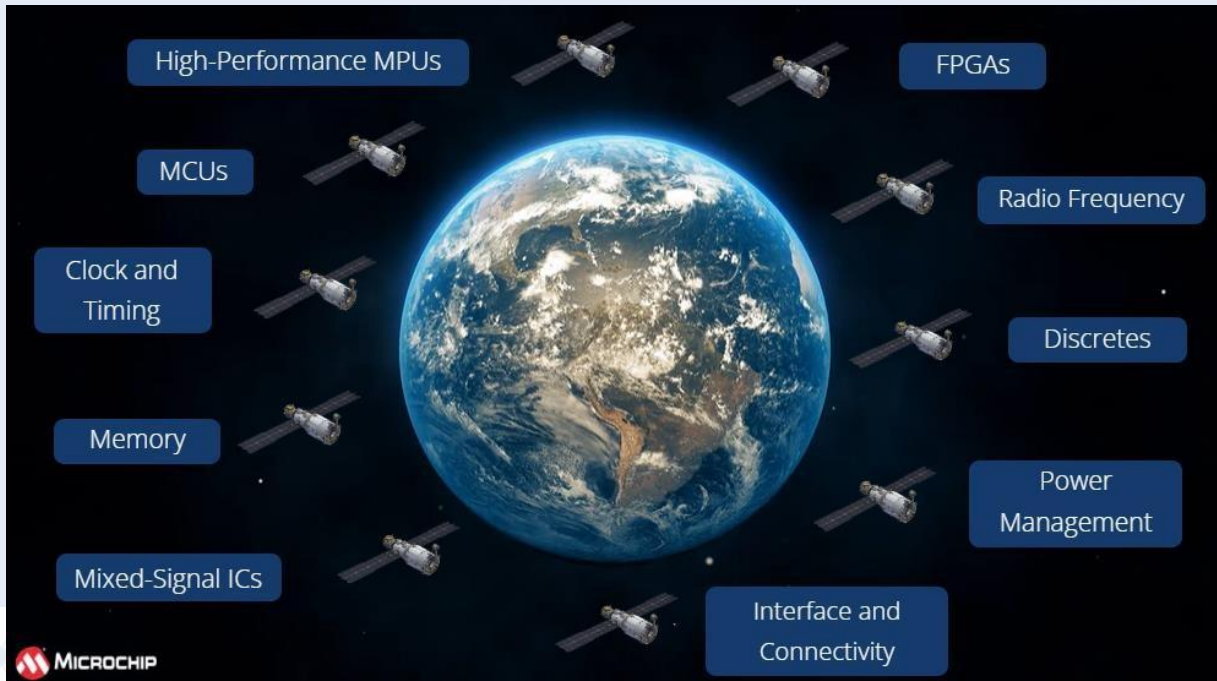
[Explore Our Products](#)



60 Years of Flight Heritage

Our portfolio represents more than 60 years of flight heritage. We are proud that our product lines have been embedded in over 90 space missions.

[Learn More About Our Heritage](#)



Aerospace and Defense Applications

Building secure, robust and reliable electronic systems for space, aviation and defense applications is critical. We have a long history and proven track record of providing innovative, reliable and high-quality solutions for these types of applications. In 1957, we supplied the electromechanical relays for the Atlas launch vehicle. Voyager 1, the furthest manmade object from Earth, has been utilizing our frequency control products to aid in the transmission of data from a distance of 13 billion miles. We have continuously expanded our product offerings to deliver the largest portfolio of aerospace and defense semiconductor solutions in the market to give you the freedom to innovate.

- Our high-reliability, radiation-tolerant and radiation-hardened products are designed and qualified for the harshest environments
- Many of our products are designed to fit small footprints, consume very little power and operate reliably in high-temperature and electromagnetic environments
- We offer a wide variety of packaging and quality screening options, including hermetically sealed and non-hermetic/plastic products screened to various qualification levels
- Our COTS-to-radiation-tolerant devices are tailored to withstand levels of Total Ionizing Dose (TID) and Single Event Effects (SEE) for lower earth orbits and new-space applications
- Our radiation-hardened devices are Rad-Hard By Design (RHBD), offering the highest levels of TID and SEE radiation performance for the most demanding applications

You can take advantage of our extensive expertise and technical support to reduce your integration risk and development time. Our development ecosystem includes IP licenses, a variety of demonstration and evaluation kits, reference designs, software, application notes and detailed documentation. Our team of engineering, sales, marketing, logistics and quality experts provide the specialized support that you need to solve your most difficult design challenges.

Explore These Application Areas



Aviation

[Learn More](#)



Defense

[Learn More](#)



Space

[Learn More](#)

Explore our Portfolio of Products

ASICs	Communication Interfaces	Discretes	Electromechanical Relays
FPGAs	Frequency and Timing	MCUs and MPUs	Memory
Mixed-Signal ICs	Power Management	RF, Microwave, Millimeter Wave	Synchronization Systems

Thank You

<https://www.microchip.com/en-us/solutions/aerospace-and-defense>