

EU Space EEE Components

*EU Policy and R&I activities serving EU Space missions
Focus: non-dependence and resilience of EEE supply chains*

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European Commission, DEFIS B2

BEHIND DG DEFIS

3 DIRECTORATES

12 UNITS

4 TASK FORCES



SET UP in 2020

Part of DG GROW until end 2019

284 PEOPLE

and growing!

25 YEARLY EVENTS

within and beyond ecosystem

The European Commission Directorate General for Defence Industry and Space is in charge of:

- upholding the competitiveness and innovation of the European Defence industry by ensuring the evolution of an able European defence technological and industrial base,
- implementing the EU Space programme,
- defining and implementing the Horizon Europe - Space R&I
- implementing the IRIS² infrastructure, and developing and implementing space-related initiatives and strategies.

The context: we are in a crisis...

1

Severe shortage of semiconductor chips

In a context of...

- Accelerated digital transition
- Increased demand for semiconductors
- Concentration of production in Asia (Taiwan, Korea)
- Reduced availability of raw materials

2

Security supply risk in the EU

Due to...

- Limited capabilities in manufacturing
- Insufficient expertise in manuf. at < 20 nm
- High entry fees / cost for new facilities
- Geopolitical tensions (e.g. South China Sea)

3

Detrimental effect across industries

Leading-edge semiconductor technology is central to...

- Competitiveness
- Security, safety and data protection
- Energetic performance of digital systems



*No single Member State can face these problems alone, need for:

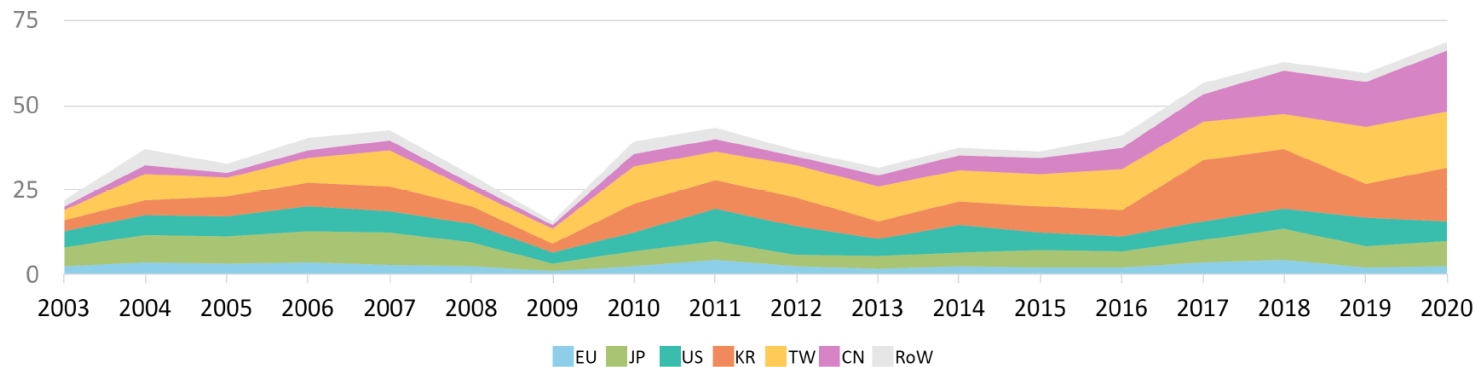
- **EU & international partnerships**
- **Public subsidies**



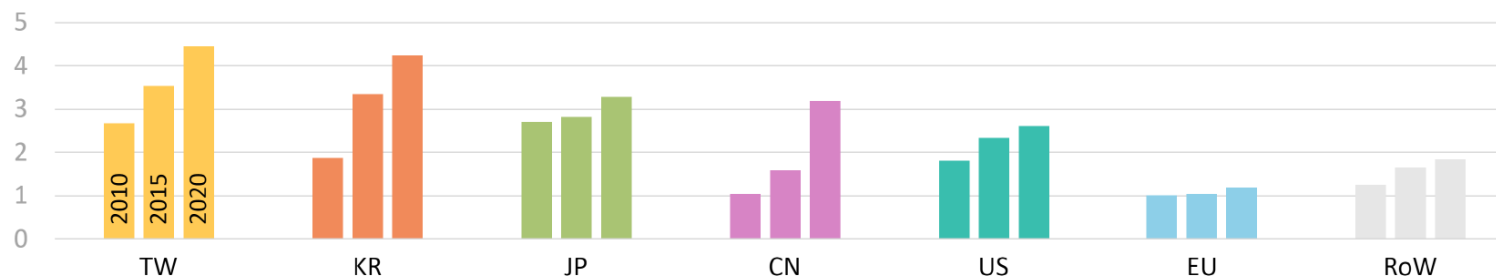
EU sanctions against Russia have banned all dual-use, advanced technologies exports for space applications

Market analysis

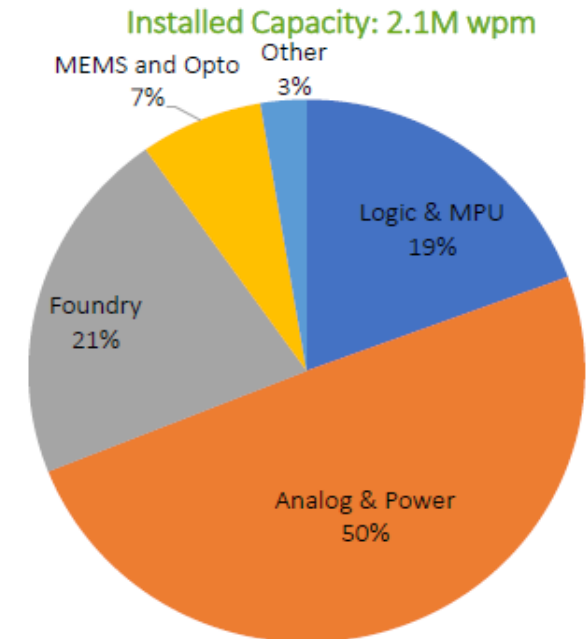
Equipment Spending by Region and Year
[sales in US\$ billion]



Total Wafer Capacity by Region (2010, 2015, 2020)
[million wafers per month]



Capacity by Product Type in Europe, 2019



Source: World Fab Forecast Report, March 2019, SEMI

Europe has not increased its investments, therefore its capacity has not grown as in other regions, and its market share has decreased from 11,7% in 2005 to 7.2% in 2020, with little presence in more advanced nodes, necessary for digital applications

EU Policy on space EEE non-dependence

- In the current geopolitical context, the EU is upholding its activities on technological non-dependency
 - Detailed mapping of space technologies supply chains (Observatory for Critical Technologies) including EEE components
 - More investments in the area of critical space technologies largely covering EEE components (Horizon Europe – 20 million per year)
 - Greater synergies between space and defence (EU Space Strategy for Security and Defence)
 - Improving the resilience of the supply chains by taking advantage of the Chips Act and Critical Raw Material Act
- This goes hand-in-hand with our objective of supporting and facilitating the insertion of EU based technologies into EU Space missions

EU Chips Act (adopted on February 8th, 2022)



- Objective: EU to reach its ambition to double its current market share [to 20% in 2030](#) by mobilizing more than €43 billion euros of public and private investments (EU contribution is €3.3 billion)
 - Pillar 1: Chips for Europe Initiative, to **strengthen existing research, development and innovation, to ensure the deployment of advanced semi-conductor tools, pilot lines for prototyping, testing and experimentation of new devices** for innovative real-life applications, to **train staff and to develop an in-depth understanding of the semi-conductor ecosystem and value chain**.
 - Pillar 2: Ensuring security of supply: by attracting investments and **enhanced production capacities, much needed in order for innovation in advanced nodes, innovative and energy efficient chips to flourish**. It will also include a dedicated semiconductor equity investment facility under InvestEU to support scale-ups and SMEs to ease their market expansion.
 - Pillar 3: Monitoring and crisis response: **A coordination mechanism between the Member States and the Commission** for monitoring the supply of semiconductors, estimating demand and anticipating the shortages. It will **monitor** the semiconductor value chain by gathering key intelligence from companies to **map primary weaknesses and bottlenecks** and coordinate **actions to be taken** from a new emergency toolbox.
- **Space is an eligible sector under the Chips Act**
- The notion of trust under a certification mechanism is foreseen

Critical Space Technologies for European non-dependence and EEE already with H2020

- Already in H2020, the EU supported the Critical Space Technologies for European non-dependence topic in the Space WP, on a yearly basis. The overall investment has been in the order of **100 million Euros**. In HE the non-dependence concept has become even more important in relationship with synergies with Defense and geopolitical considerations (era post February 21st, 2022).
- In H2020 almost 65% of this budget has been used for developing EEE for Space applications from prove of concept up to Space qualification

Critical Space Technologies supported by EU

- Major areas of R&D, space evaluation/qualification and related EU investments in the last years

FPGA (~13M€)

Design, validation and ESCC qualification (NG-MEDIUM, LARGE, ULTRA) and preliminary work on 7nm

ASICS (~9,5 M€)

Design, manufacturing, space evaluation

SYSTEM ON CHIPS (~8M€)

Design, manufacturing, space evaluation

RF GAN (~13M€)

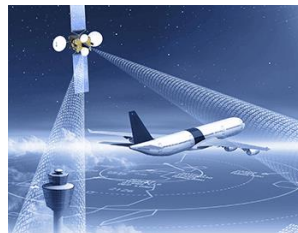
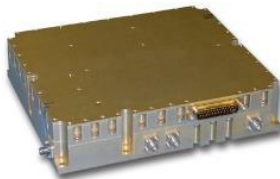
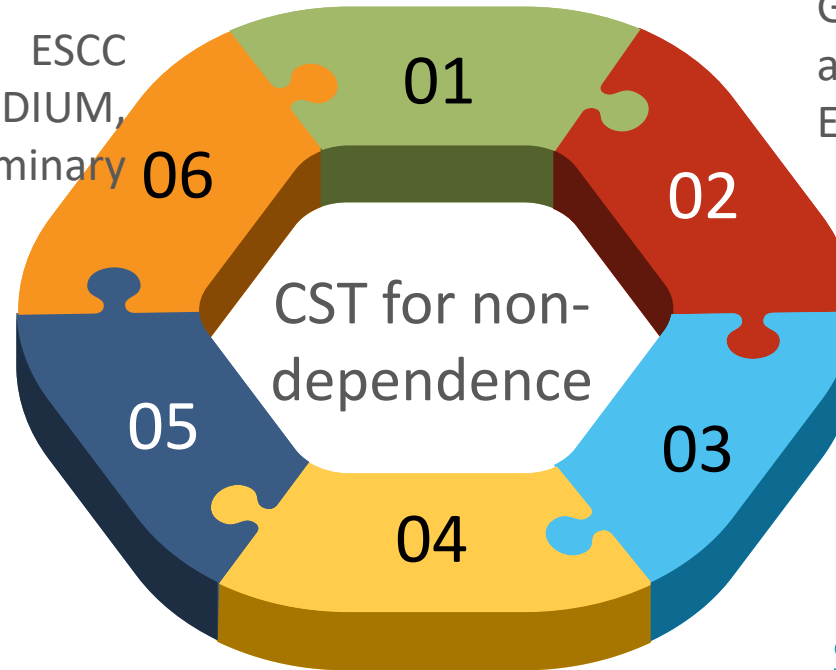
GaN process development and maturation, including ESCC space evaluation

ADVANCED PACKAGES (~6M€)

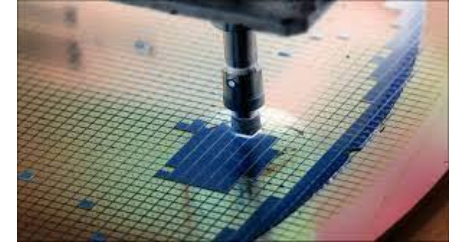
High thermal dissipative and large pin count packages development and qualification

SOLAR CELLS (~6M€)

High efficiency solar cellc based on triple junctions and high quality Ge substrates



Horizon Europe - Space Research EU Programme



- One of the pillars of the Programme is **EU autonomy**, contribution to **EU's technological sovereignty, non-dependence** and decisive key capabilities
- Developing and building upon technologies that contribute to reducing EU non-dependence is a notion that touches several Space Calls, additionally as per H2020 there is a dedicated WP Topic dedicated to **Critical Space Technologies for European non-dependence** also in HorizonEurope
 - The CST for European non-dependence topic will cover **end to end development** activities therefore design, manufacturing and qualification
 - For EEE component a formal **ESCC based Space Evaluation and/or Qualification** will be the **suggested suitable approach**
- Support the development of critical **EEE components** that could be **exploited by EU space missions**, including the ones with security requirements

Non-dependence related requirements



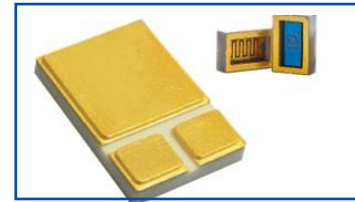
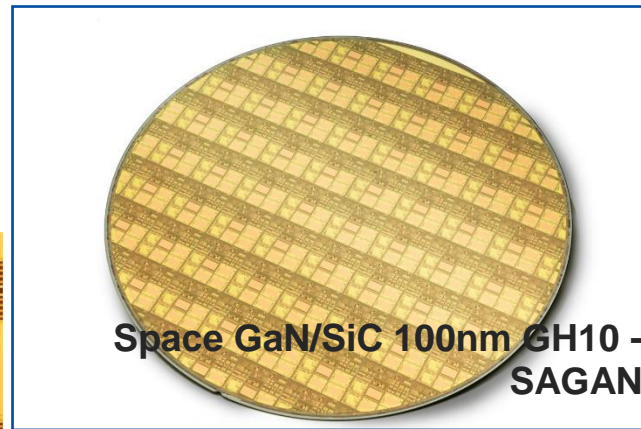
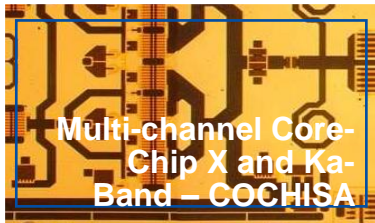
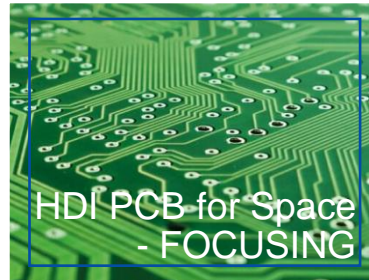
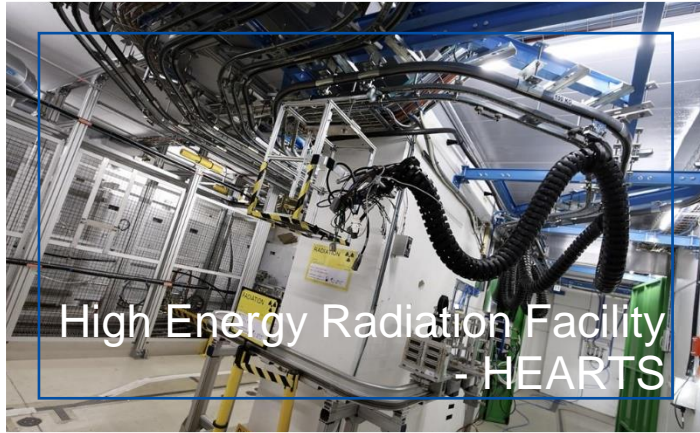
- **Eligibility**

- participation is **limited** for the moment to **legal entities established in Member States, Iceland and Norway**

- **Legal obligation**

- **For a period of up to 4 years after the end of the project, access rights to the use of products and/or processes generated by the project** shall be given to European entities, in compliance with the signed Grant Agreement and with no legal restrictions and limitations stemming from International Traffic in Arms Regulations (ITAR), EAR99 or equivalent instruments applicable in other jurisdictions
- Already at proposal level, to achieve the non-dependence objective, applicants must
 - Describe the technologies and/or technology processes to be used and show that they are free of any legal export restrictions or limitations, such as those established in the International Traffic in Arms Regulations (ITAR), Export Administration regulation (EAR) such as EAR99 or equivalent instruments applicable in other jurisdictions;
 - Set up a suitable technology development process aiming at avoiding export restrictions of non-EU states and assess vulnerabilities of the supply chain.

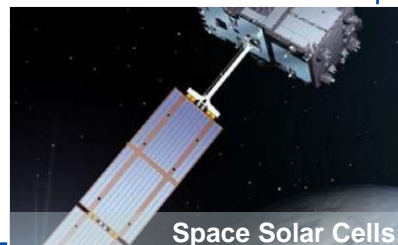
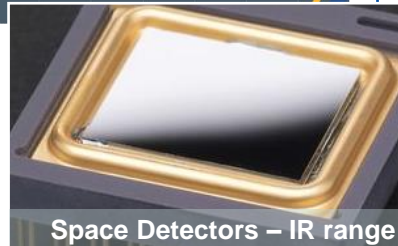
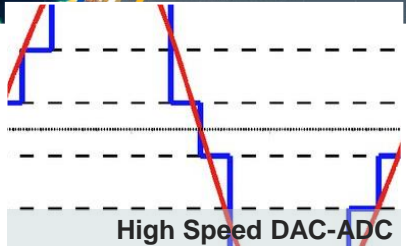
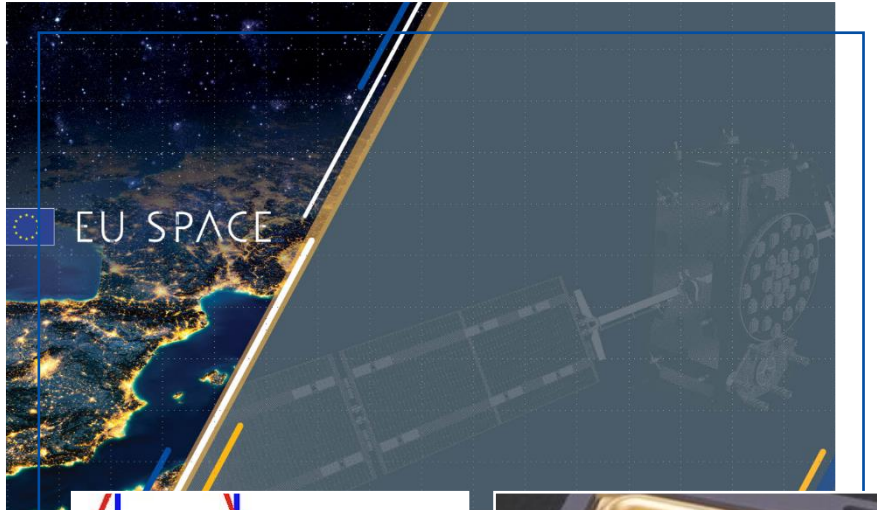
EU EEE projects recently kicked-off



- Selected projects to cover key areas where EU targets strategic autonomy
 - This includes **development of new EEE components** as well as **testing facilities particular critical for space applications**
- Objective to increase the resilience of Space EEE components by building **supply chains free of any non-EU export restrictions**
- Non-dependence Space projects kicked off in the last months had a budget envelope of 20,5 million Euros

Space EEE areas – 2023 EU Space Programme

EU Space open call relevant for EEE



In 2023 the Commission will initiate new Space projects in the area of critical space technologies.

The objective is to reduce dependencies and push forward the performance levels to meet the need of EU Space missions

- Total budget 20 million Euros
- Call closure March 28th



IRIS²

INFRASTRUCTURE FOR
RESILIENCE,
INTERCONNECTIVITY
AND **SECURITY**
BY **SATELLITE**

New EU Space mission

- Relying on disruptive technologies including quantum cryptography
- Secure and simultaneous broadcasting
- Aims to enhance the European strategic autonomy and technology sovereignty

A global, multi-orbital, secure architecture, built on GOVSATCOM and EuroQCI

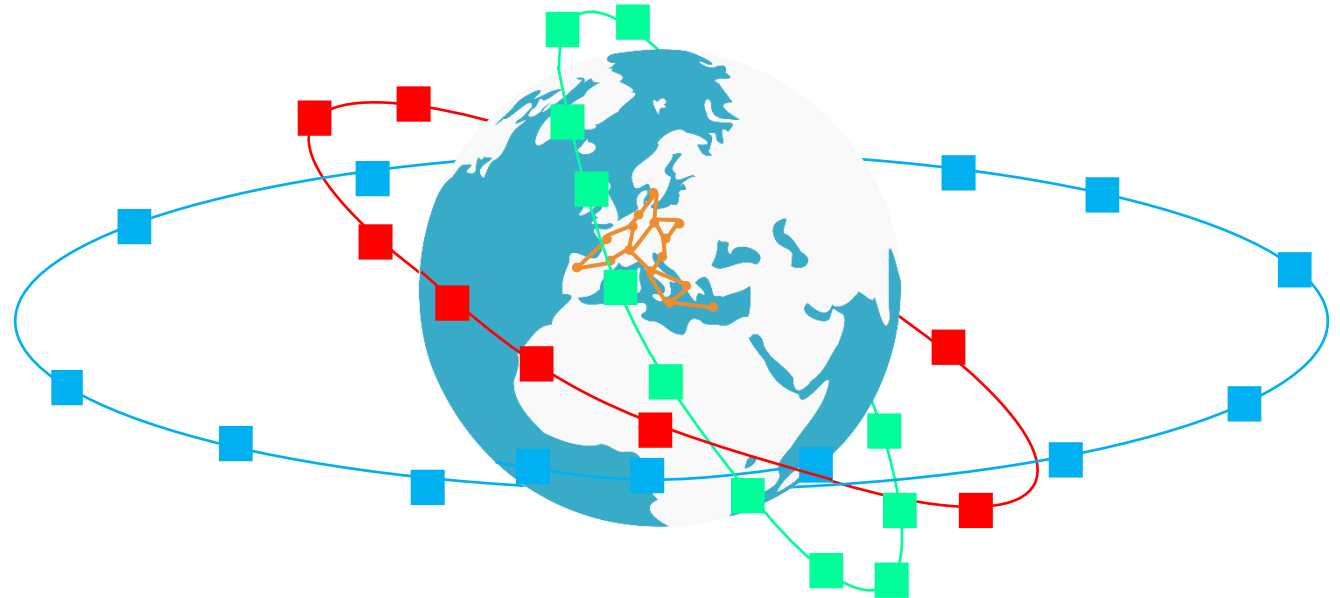
Multi-orbital constellation: combining LEO, GEO, MEO

Secure: Strong encryption (QKD), cyber resilience, proactive and reactive defence against cyber and RF threats, operational cybersecurity (SOC/GSMC)

Global Coverage : with focus on Europe, and where strategic interest, e.g. Arctic and Africa

Innovative: system must integrate innovative/disruptive technologies and services, valorising European New Space

Scalable: adaptable to demand growth



Governmental use cases are evolving, requiring higher performance and global coverage

Governmental services



CONNECTING KEY INFRASTRUCTURES

- Governmental & Institutional secure communications
- Management of Infrastructures (air, rail, road, traffic management)
- Contribution to EU Space Programme components
- Command and control of smart grids and M2M (energy, finance, health, data centres...)



CRISIS MANAGEMENT AND EXTERNAL ACTIONS

- Civil protection
- External action, National Forces deployment
- Humanitarian aid, DG ECHO satcom services
- Telemedicine
- Maritime emergencies (search and rescue)



SURVEILLANCE

- Border and remote areas surveillance
- Remote Piloted Aircraft systems
- Maritime surveillance
- Arctic region coverage
- Complement to military missions
- Space surveillance



MASS-MARKET

- 5G / 6G integration
- Edge computing
- Autonomous driving
- e-health
- Smart working, education
- In-Flight, maritime connectivity
- Smart agriculture
- IoT

ILLUSTRATIVE – TO BE AGREED WITH PRIVATE SECTOR PARTNER

EEE in IRIS²

- The new EU space mission will represent an opportunity for EU based EEE components that could respond to the security requirements
- DG-DEFIS is currently drafting the mission requirements
- Current discussions are on going to foster the exploitation of EU technologies developed through EU Space research programmes including also non-dependent EEE components
- Many of the EEE components developed through the EU Space programme (e.g. FPGAs, ASICs, GaN devices, SoCs, memories,...) are suitable for IRIS² architecture

Thank you

BACKUP SLIDES