INNOVATIVE, MOBILE AND SATELLITE COMMUNICATIONS

IMST GmbH

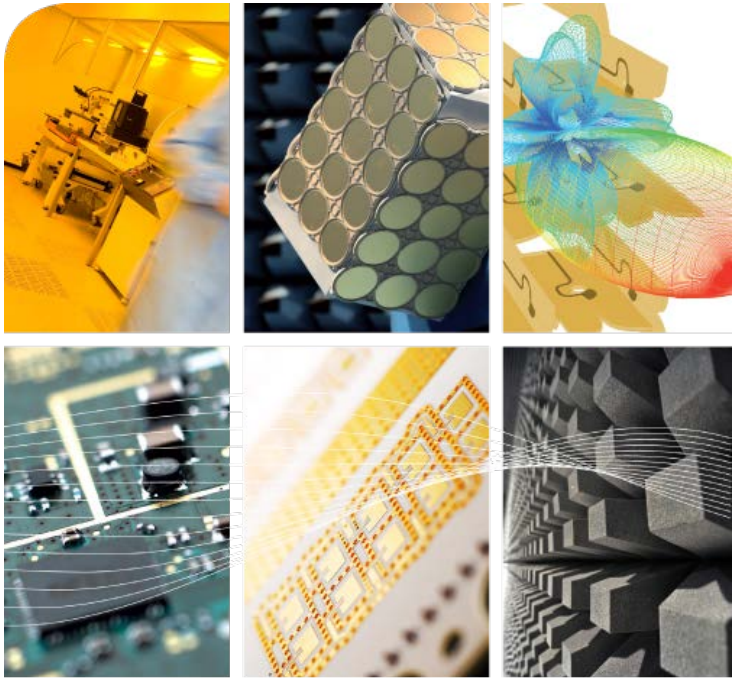
ESCCON 2019

Overview

- **Company Profile**
- **Approval Process of an ESCC Qualified ASIC Supply Chain**
- **Novelo – RadHard Wide Band Synthesizer**
- **Design / Product Examples**

YOUR CHALLENGES, OUR SOLUTIONS!

- **Design & Engineering for**
  - Wireless Radio Systems
  - Microelectronics
  - Antennas
- **By providing**
  - Contractual design work
  - Applied research
  - Licensing of technology - IPRs
  - Shipment of radio modules
  - Testing and certification
- **In Global Markets**
  - Satellite and Space Industries
  - IT and Mobile Communications



IMST – FACTS AND FIGURES

- **Foundation:** 1992
- **Shareholder:** Prof. Dr. Ingo Wolff
  Dr. Peter Waldow
  IMST BG GmbH & Co.KG
- **Member of Staff:** 170 Employees
- **Headquarters:** Kamp-Lintfort, Germany
- **QM System:** DIN EN ISO 9001:2015
  DIN EN ISO/IEC 17025:2005

OUR COMPETENCE AT A GLANCE

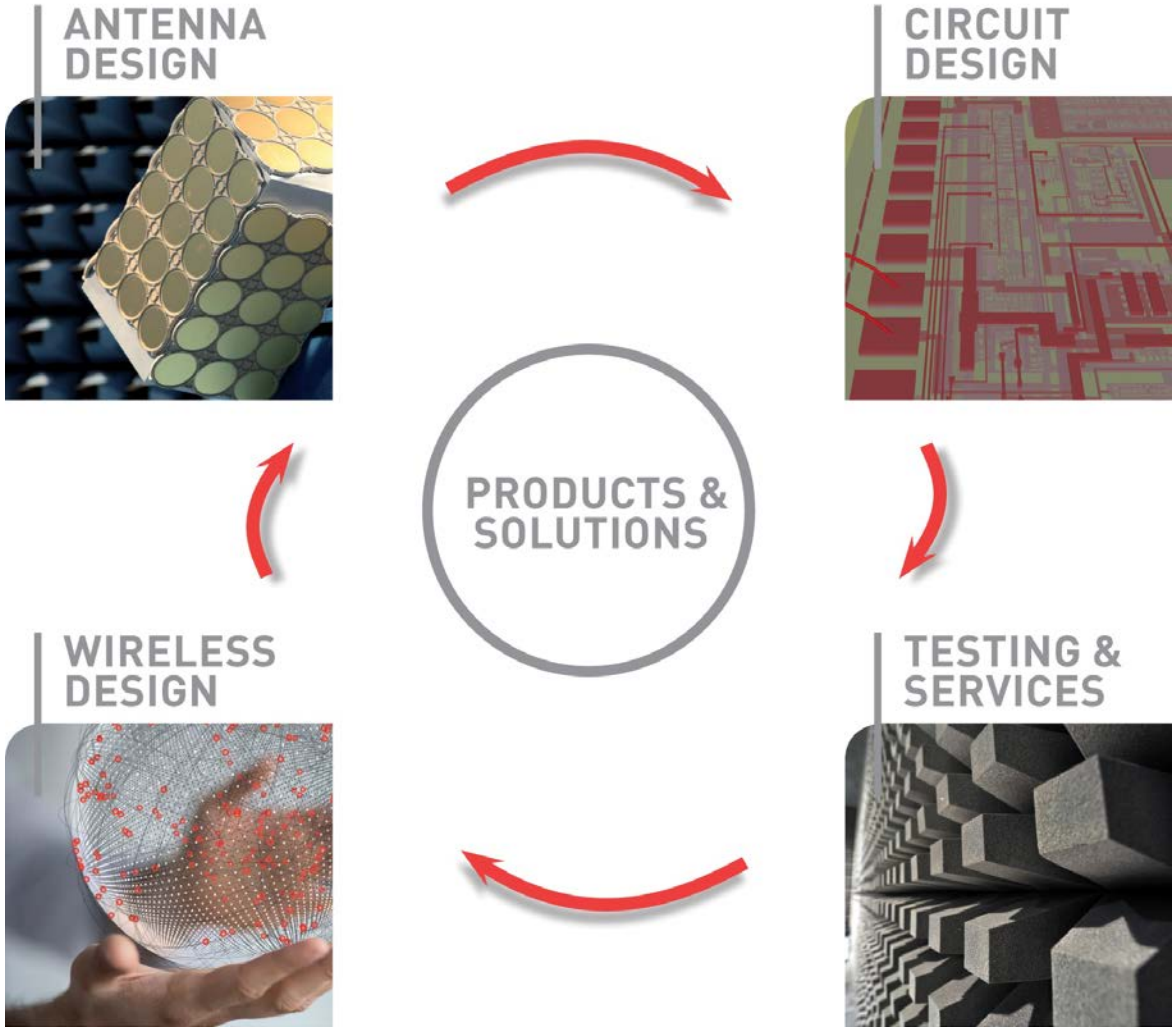
- **Development:**
  Hard- and Software for Radio Solutions // Antennas // Modules and Components for Radio Systems // RF & Microwave Circuits in CMOS, GaAs, SiGe // LTCC- and Hybrid Circuits

- **Research:**
  Public funded research at regional, national and European level // Applied Research // Know-How Acquisition

- **Products:**
  EDA design tools: EMPIRE XPU™, SpurSim™ // LoRa® - Long range radio solutions // WiMOD™ -Wireless M-Bus and ISM band radio solutions // LTCC modules // Sentire™ Radar solutions

- **Services:**
  Accredited test centre for electromagnetic compatibility (EMC) // Specific absorbtion rate (SAR) testing for terminals // Antenna testing // Radio spectrum testing (ERM) // Rapid prototyping // Sampling and manufacturing of electronics

“ONE-STOP-SHOP” DEVELOPMENT



Approval Process of an ESCC Qualified ASIC Supply Chain

Approval Process of an ESCC Qualified ASIC Supply Chain

- Advantages of a Qualified Supply Chain
  - Reduction on development time
  - Lower Risk and Costs
- Technology
  - XFABs XH018 has been validated to be suitable for RadHard designs
  - Support for customers with low wafer numbers
  - TMR approach for digital designs
- HARD Library Developed at IMST
  - Mixed Signal IP Library tested against TID and SEE
  - IP Library covering wide range of applications
    - I/O Cells, Data converter, Opamp, Biasing, LVDS, OTP …

ASIC Supply Chain Flow Chart

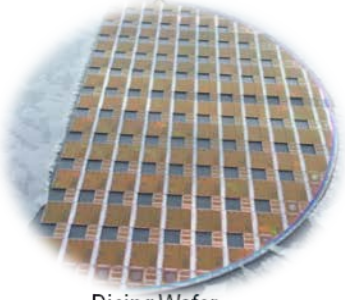
Design &Layout with Hard Lib

- IMST
- Customer optional digital

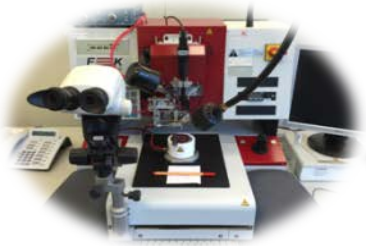
Wafer Manufacturer

- XFAB

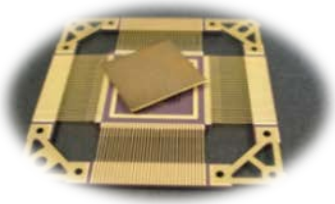
Wafer Test



Dicing Wafer



Die assembly



ASIC Specification

- IMST
- Customer

Package Test & Screening

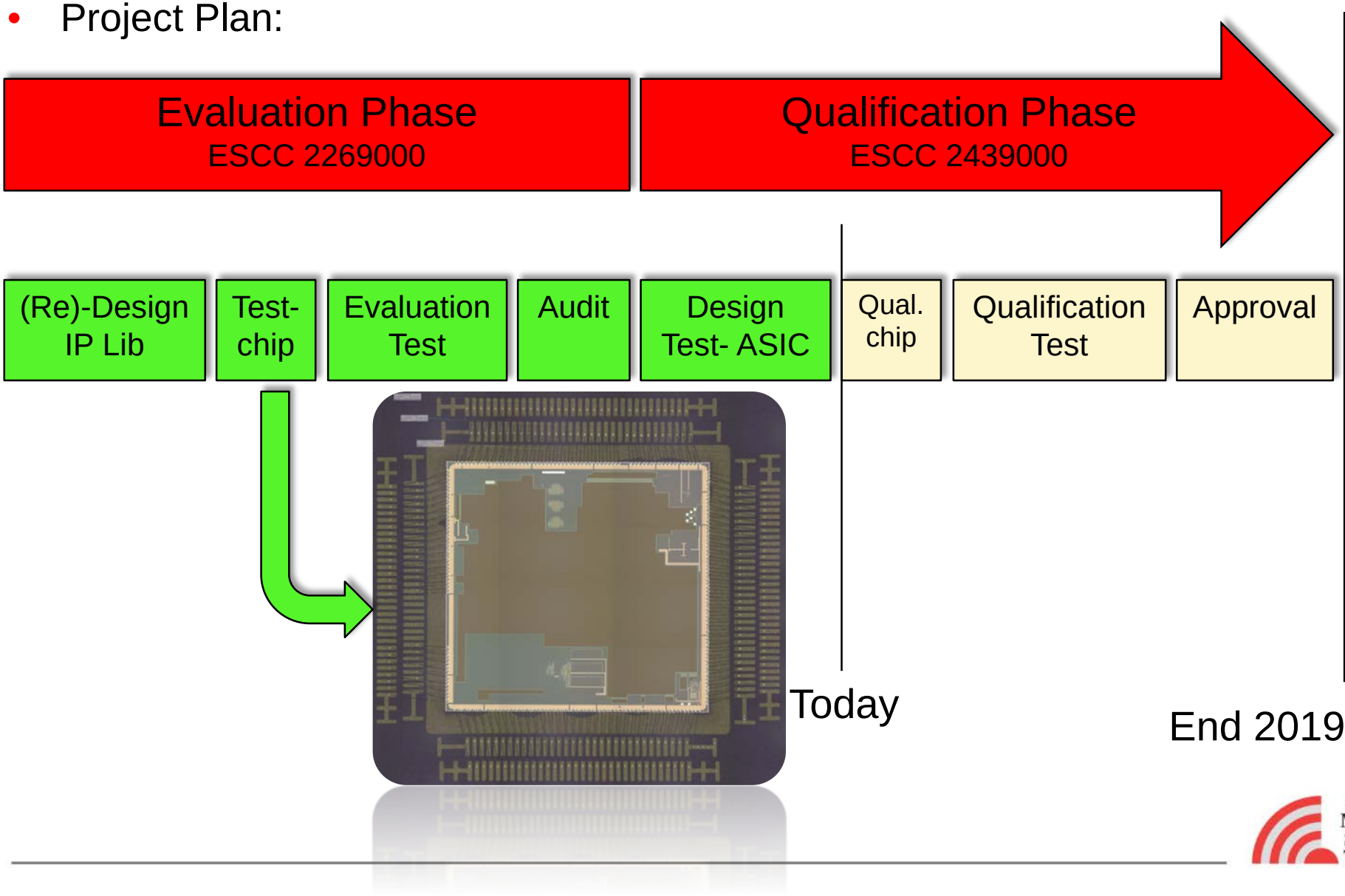
Lead forming

- optional

Qualified ASIC

Status of the ASIC Supply Chain

- Project Plan:

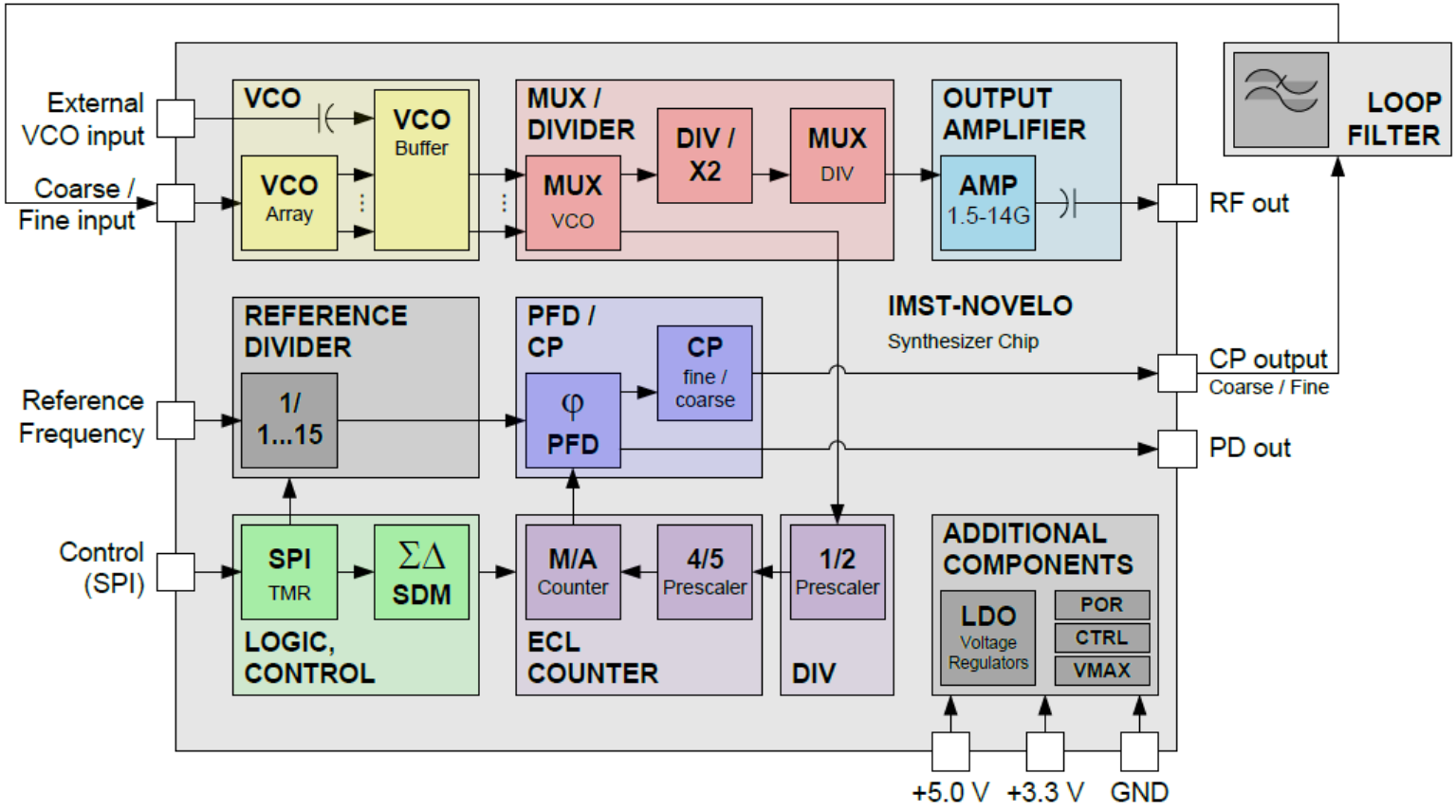


NOVELO:

Wide Band Synthesizer for Space Applications

Radiation Hard Fractional-N Synthesizer

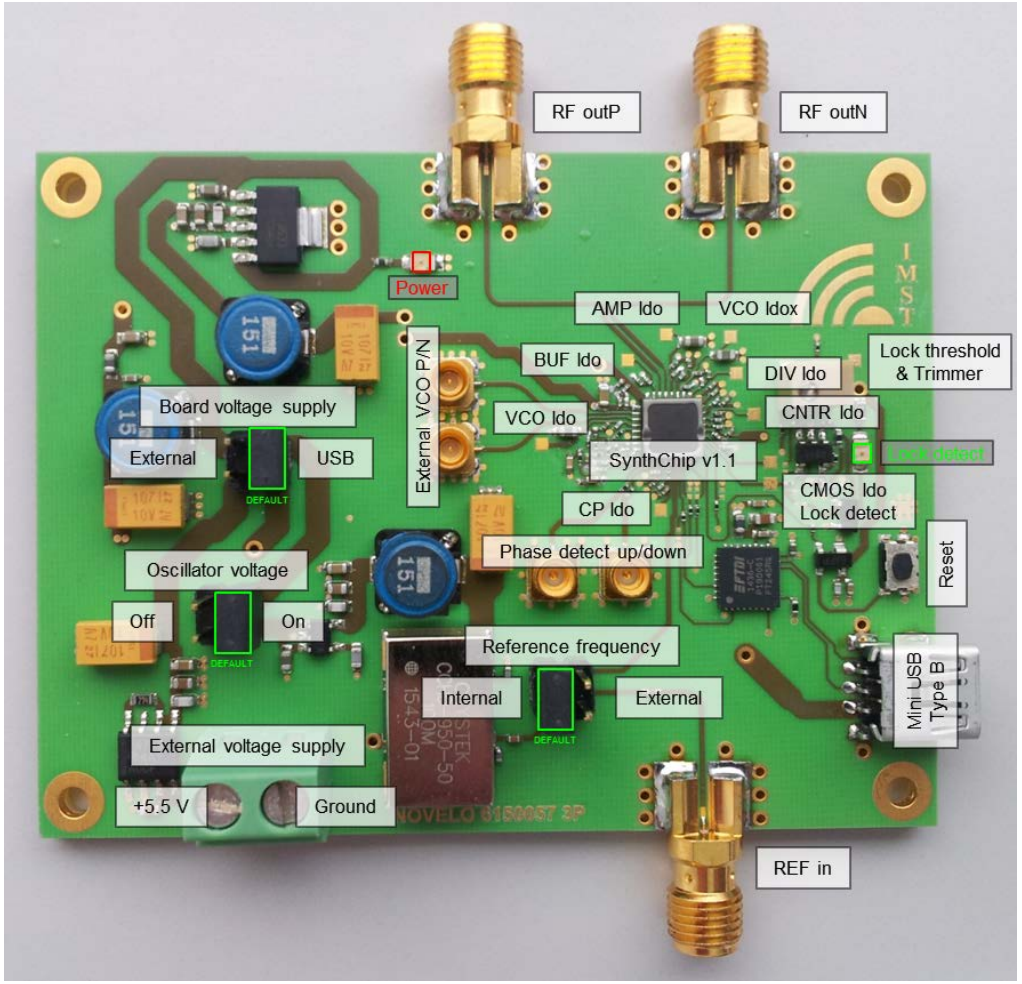
- 1-chip fractional-N synthesizer
- 1.5 – 12 GHz, 1 Hz resolution
- 0.6 RPM at 9.8 GHz
- 300 kRad TID
- LET SEU Tolerance: 120 MeV/mg/cm²
- LET SEL Tolerance: 32 MeV/mg/cm²



Evaluation Board

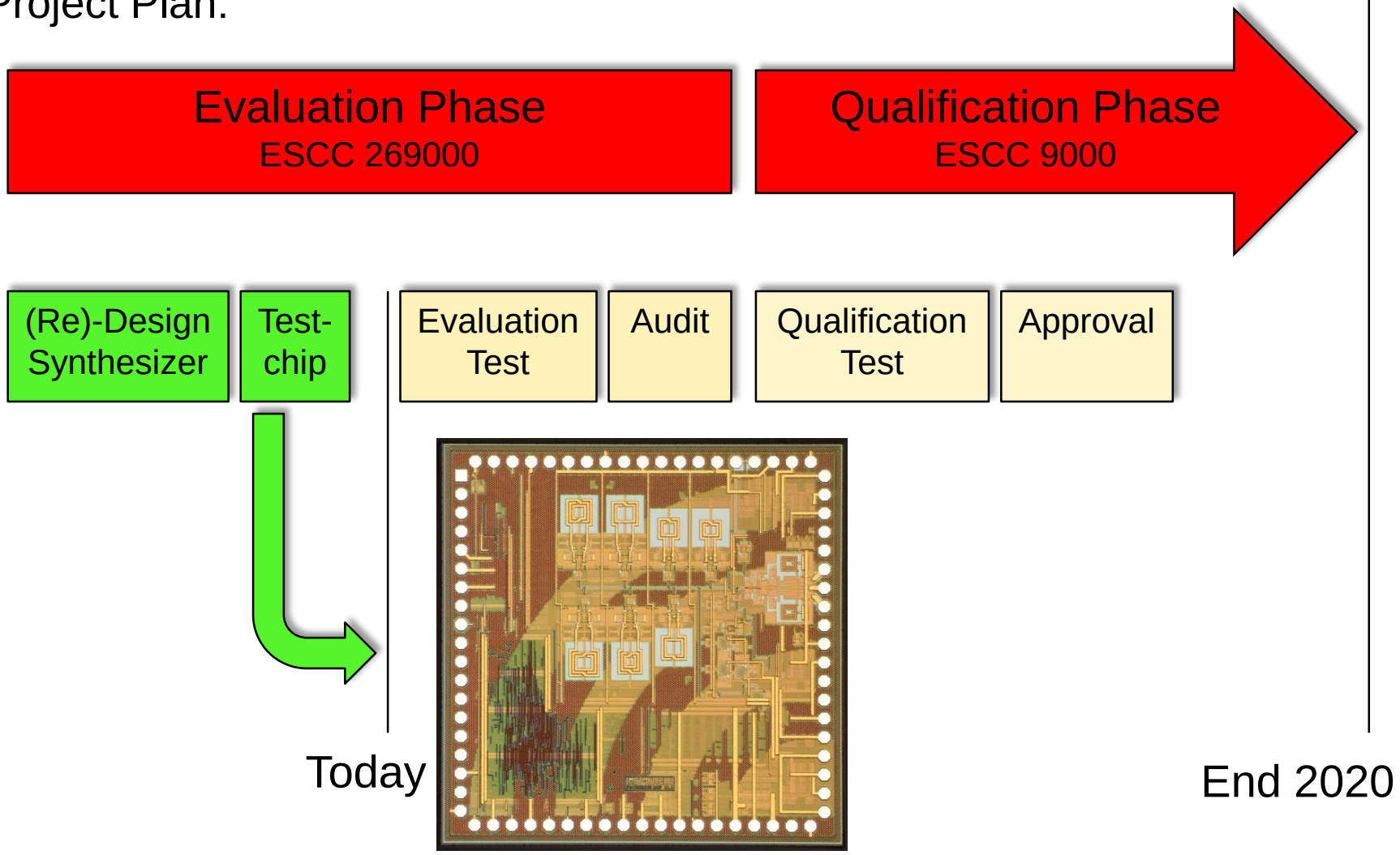
- Evaluation board available on request

- GUI available to control the Synthesizer



Status of the NOVELO Synthesizer

- Project Plan:



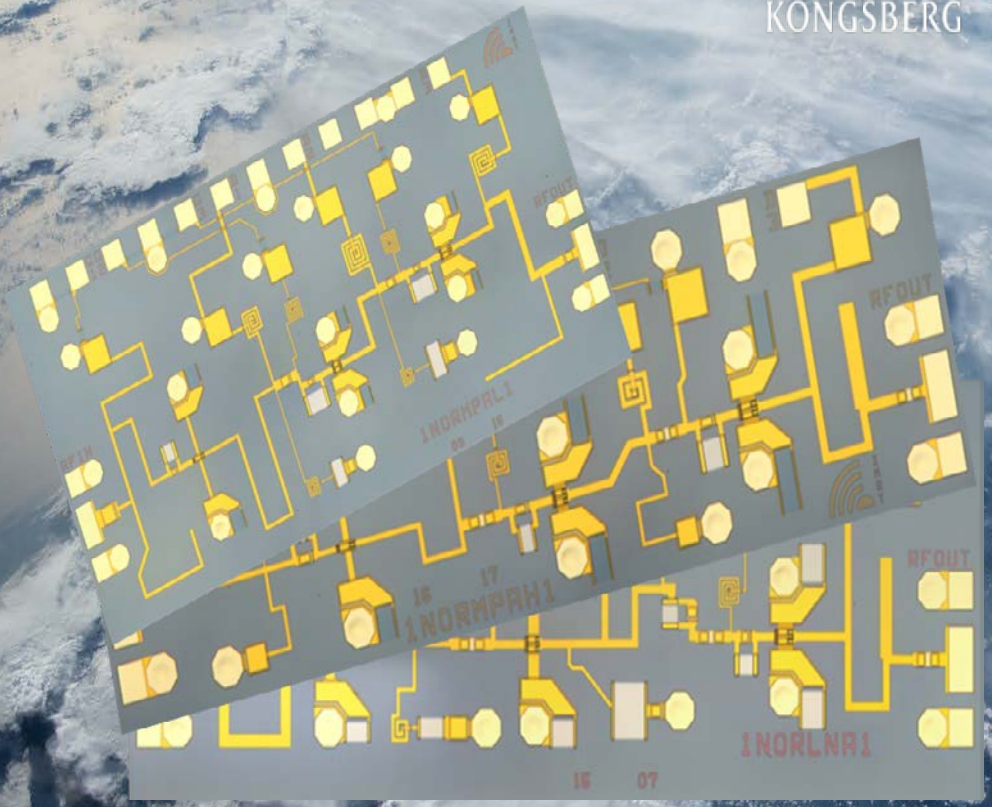
Design / Product Examples

INTEGRATED CIRCUITS

Satellite Usage

RCS

KONGSBERG



- Flight models
- Low noise and medium power amplifiers
- 13-21 GHz, 20-31 GHz, 21-28 GHz
- First shot success

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PASSIVE DESIGN EXAMPLE

Satellite Power Distribution Networks

- TerraSAR-X
  - 1:32 Power Divider at 9.65 GHz,
  - 70 cm x 7.2 cm
  - Single layer PTFE board
- TerraSAR-L
  - 1:7 Power Divider at 1.26 GHz,
  - 1.2 m x 20 cm
  - Multilayer PTFE board
- Easton
  - German Space Agency
  - Power Divider at 19 GHz in LTCC
  - 1:4 Divider, 6.5 cm x 3.5 cm

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ON-ORBIT VERIFICATION

Technology Evaluation Satellite

- Successfully tested hermetically sealed LTCC packages
- Successfully tested GaAs and SiGe MMICs
- Complete flexible down-converter module in preparation

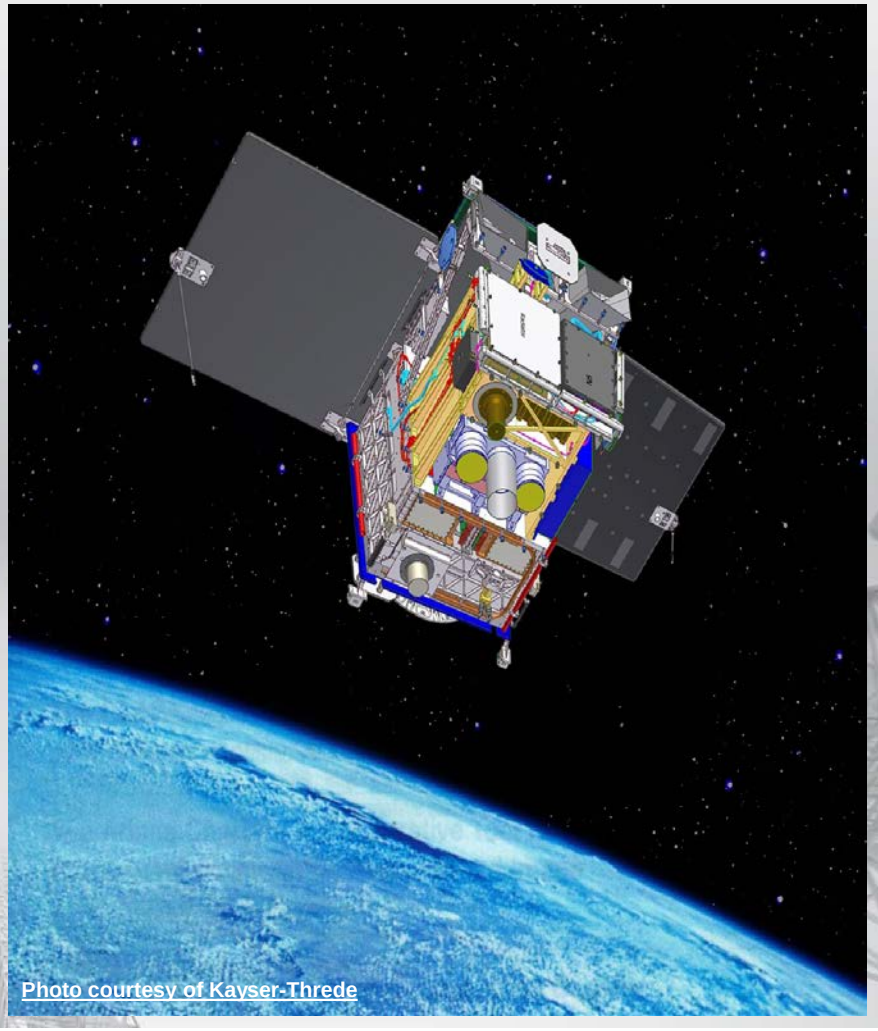

Photo courtesy of Kayser-Threde

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THANK YOU FOR YOUR ATTENTION!

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