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
  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:**

- **Services:**
  Accredited test centre for electromagnetic compatibility (EMC) // Specific absorption rate (SAR) testing for terminals // Antenna testing // Radio spectrum testing (ERM) // Rapid prototyping // Sampling and manufacturing of electronics
“ONE-STOP-SHOP” DEVELOPMENT

ANTENNA DESIGN

PRODUCTS & SOLUTIONS

CIRCUIT DESIGN

WIRELESS DESIGN

TESTING & SERVICES
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

1. Design & Layout with Hard Lib
   - IMST
   - Customer optional digital

2. ASIC Specification
   - IMST
   - Customer

3. Package Test & Screening

4. Wafer Manufacturer
   - XFAB

5. Die assembly

6. Dicing Wafer

7. Wafer Test

8. Lead forming
   - optional

9. Qualified ASIC
Status of the ASIC Supply Chain

- Project Plan:

  Evaluation Phase
  ESCC 2269000

  Qualification Phase
  ESCC 2439000

  (Re)-Design
  IP Lib

  Test-chip

  Evaluation
  Test

  Audit

  Design
  Test- ASIC

  Qual. chip

  Qualification
  Test

  Approval

Today

End 2019
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:

  Today End 2020

  Evaluation Phase
  ESCC 269000

  Qualification Phase
  ESCC 9000

  (Re)-Design Synthesizer
  Test-chip

  Evaluation Test
  Audit
  Qualification Test
  Approval

  End 2020
Design / Product Examples
INTEGRATED CIRCUITS

Satellite Usage

- Flight models
- Low noise and medium power amplifiers
- 13-21 GHz, 20-31 GHz, 21-28 GHz
- First shot success
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
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
THANK YOU FOR YOUR ATTENTION!