

# CAN First-TF Communauté Autour du Numérique de First-TF

<http://first-tf-can.utinam.cnrs.fr>

Site web de la communauté  
Community web site



[can@first-tf-can.utinam.cnrs.fr](mailto:can@first-tf-can.utinam.cnrs.fr)

Liste de diffusion  
Mailing list

Contact : [contact@first-tf-can.utinam.cnrs.fr](mailto:contact@first-tf-can.utinam.cnrs.fr)

## Wiki

Favoriser les échanges, développer des méthodes pour l'instrumentation temps-réel de haute précision. Create exchange and develop high-precision digital methods and realtime instrumentation. Suggestion de thèmes abordés sur le site collaboratif type wiki - Topics available on the wiki-like collaborative platform :

- Fully digital signal analysis, quantification, noise
  - Servo controls
  - Digital Lock-in amplifiers
  - DDS & PLL
  - Atoms & objects manipulations
  - Time to Digital converters, Electronic counters
  - Noise generators, . . .
  - GPS systems
  - Time in Networks (White Rabbit, ...)
  - Software-defined Radio
  - Open-Source instruments
- Research, Amateur Radio, Education, Popularization

## Champs des activités – Activity fields

–**Veille technologique** : techniques en électronique « numérique » appliquées aux aspects T/F, état de l'art, réflexions communes, nouvelles approches. *Technological watch: T/F digital designs, state-of-the-art, joint discussions, new solutions.*

–**Pédagogie** : portail web CAN (bibliographie, aide et initiations), développement de maquettes, support aux formations de FIRST-TF. *Training: online portal CAN (bibliography, designs guides), prototyping, materials for FIRST-TF.*

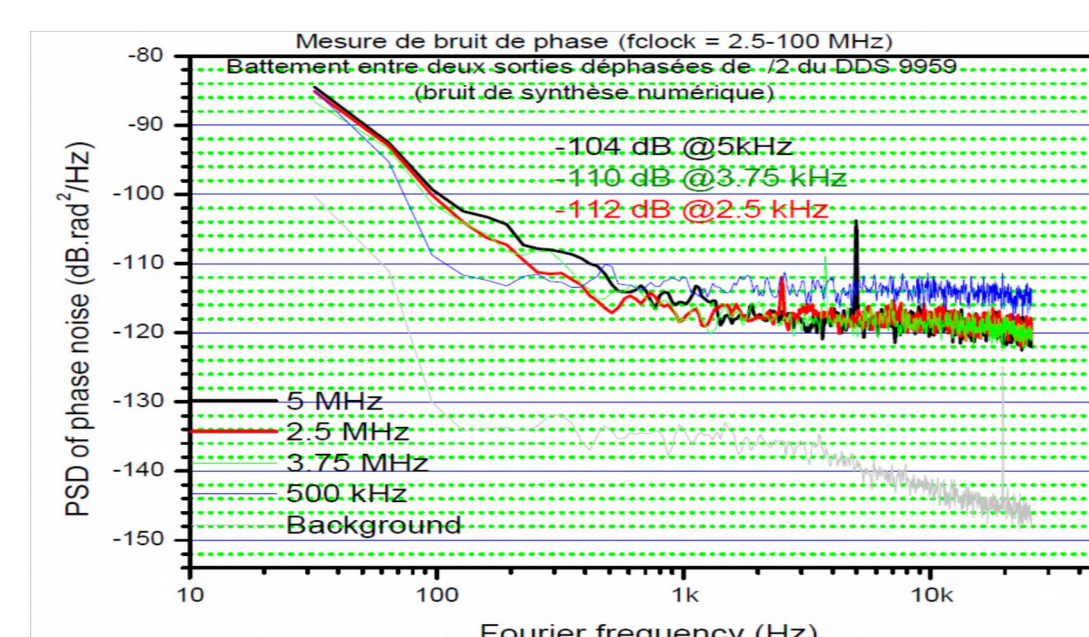
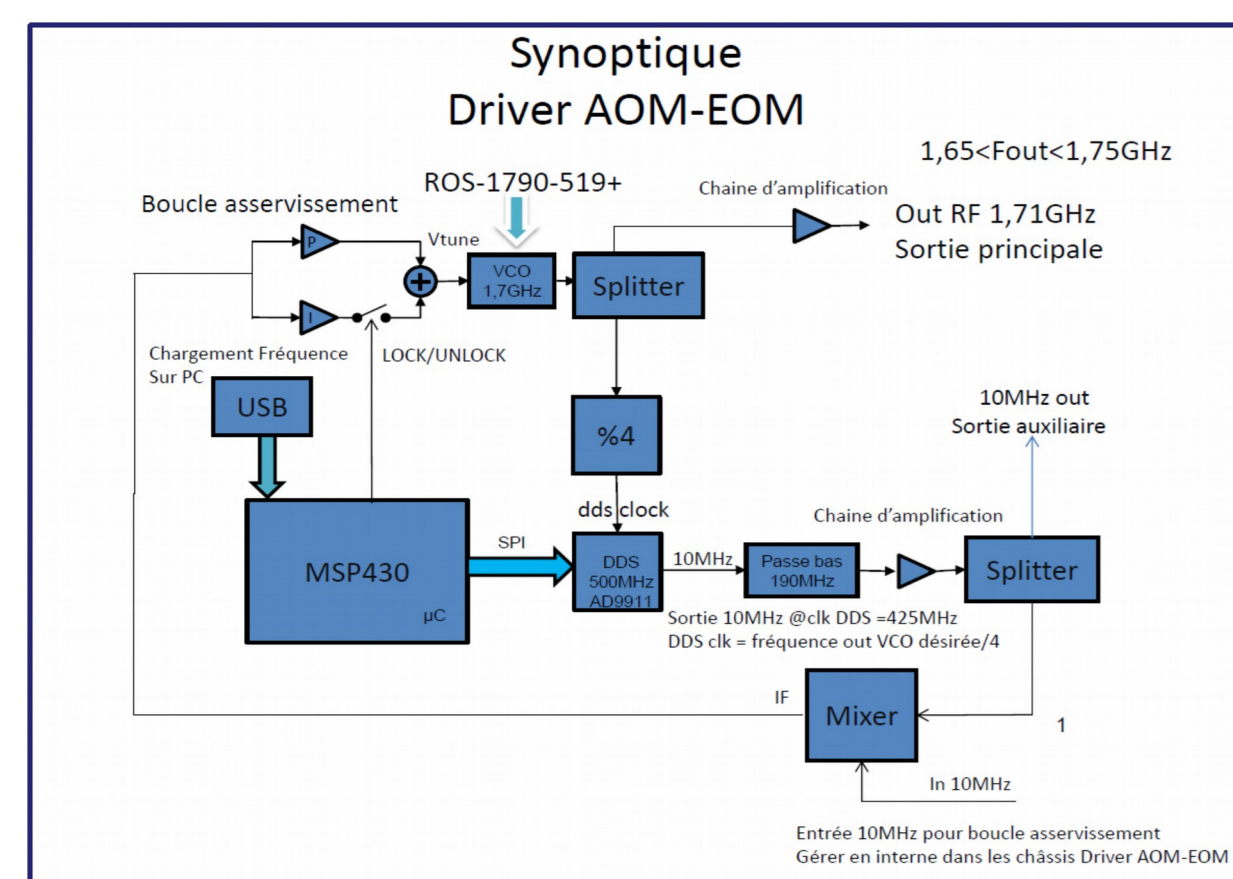
–**Echanges techniques** : wiki, liste de diffusion, organisation d'ateliers. *Experience sharing: wiki, mailing list,, workshops organisations.*

– **Soumissions de projets** pour financement par FIRST-TF. *Proposals for financial support by FIRST-TF.*

–**Publications techniques / Technical publications**

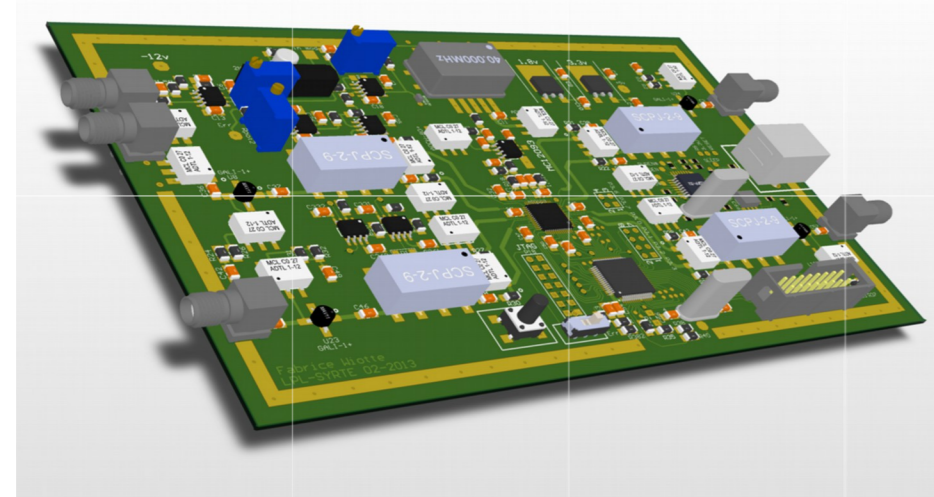
–**Favoriser les collaborations / Develop Collaborations**

## Cold-atoms : AOM/EOM drivers



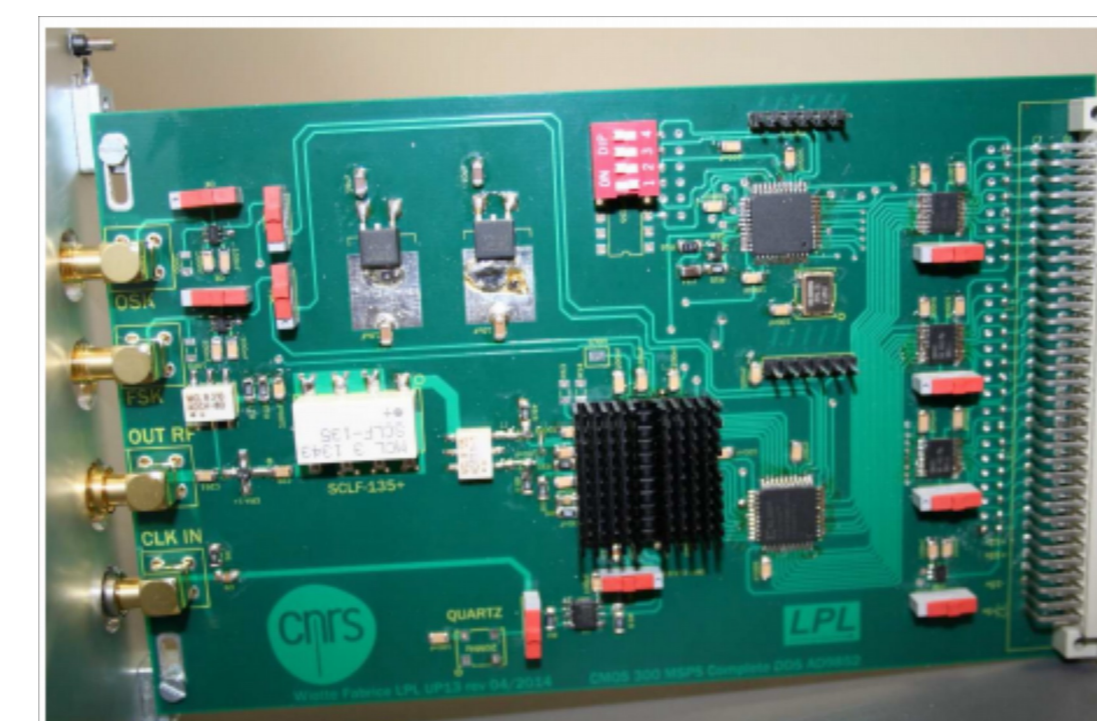
- Features of DDS CARD AD9959
- SPI mode 2 wires @8MHz
- 4 RF outputs useful 100KHz to 190MHz
- MSP430 16-bit interface@8MHz
- Pc com via USB to serial converter
- CVI interface

- Features of DDS CARD ON RACK
- SPI mode 3 wires @10MHz
- 5 RF outputs useful 100KHz to 130MHz
- TM4C Séries 32-bit interface@80MHz
- Pc com via USB to serial converter
- CVI interface or touchscreen

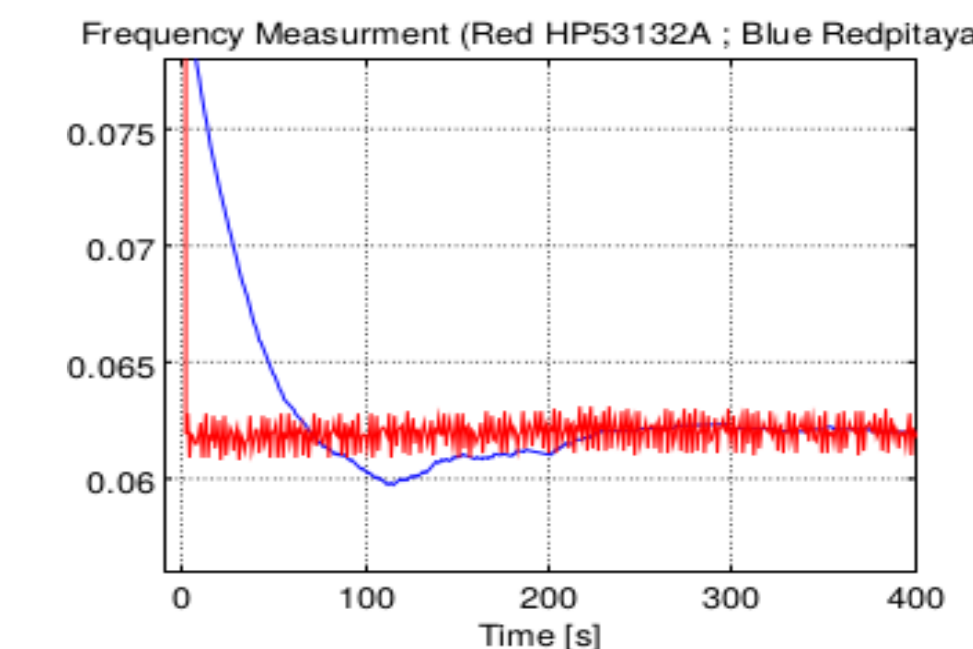
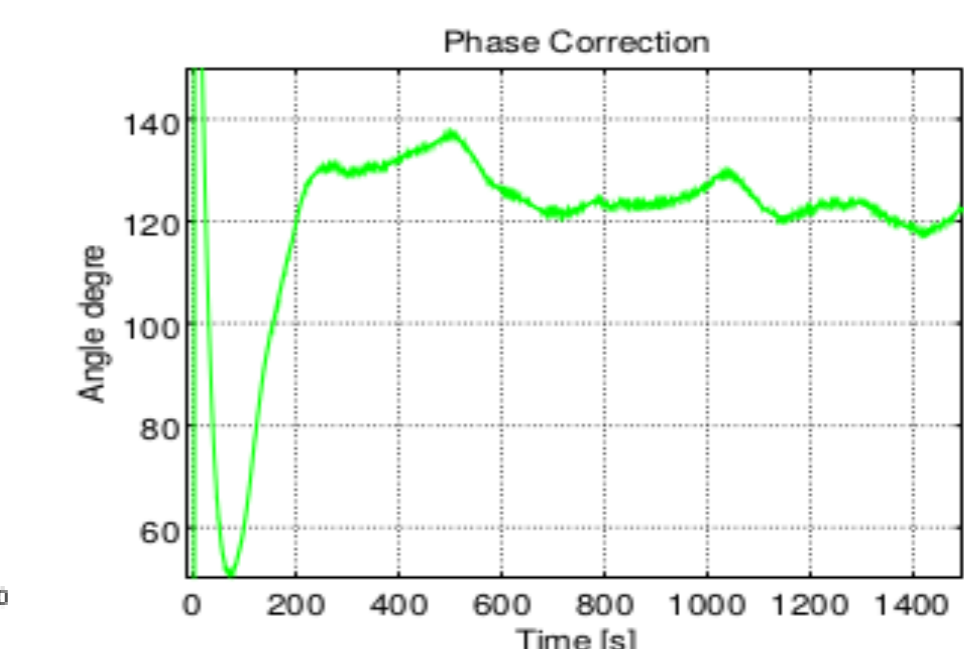
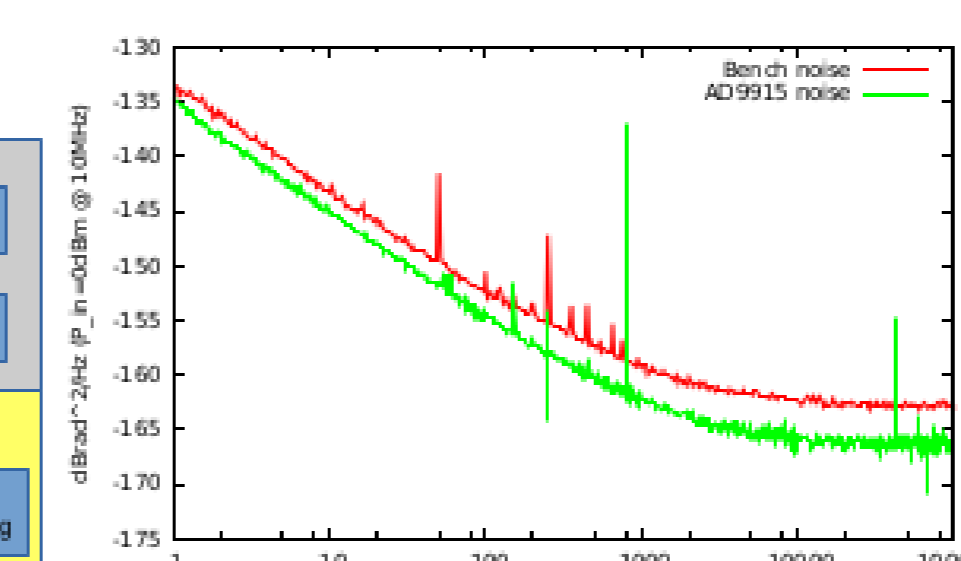
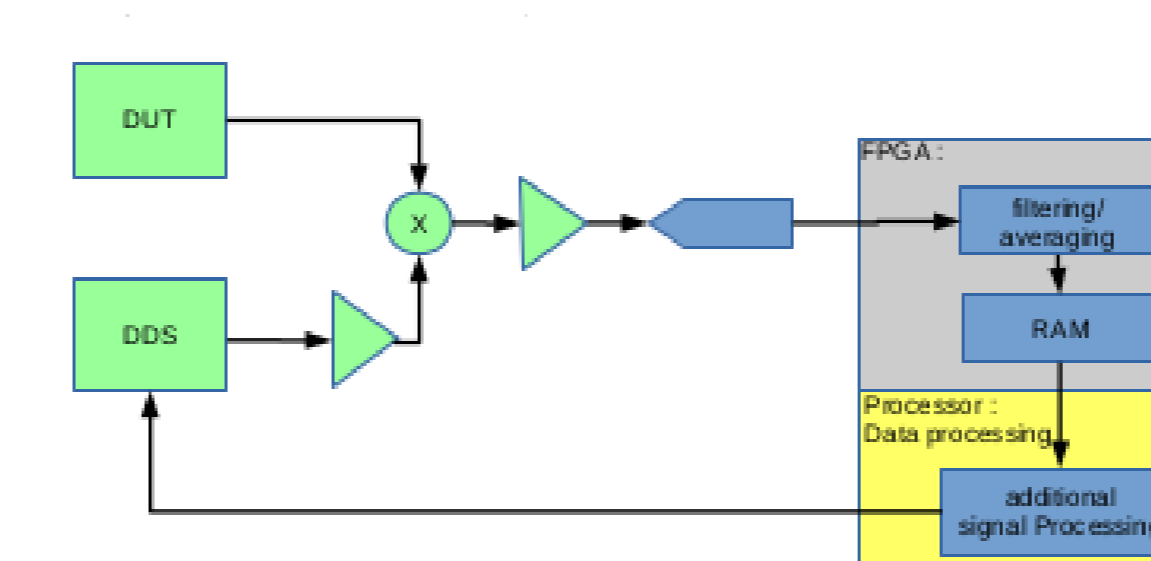


## Examples of Realizations

- Features of DDS CARD AD9852-58
- Parallel mode 8 bits @10MHz
- 1 RF output useful 100KHz to 130MHz
- 100KHz to 400MHz for AD9858
- OSK and FSK capabilities
- Pc com DIO 32 National Instruments
- LABVIEW interface

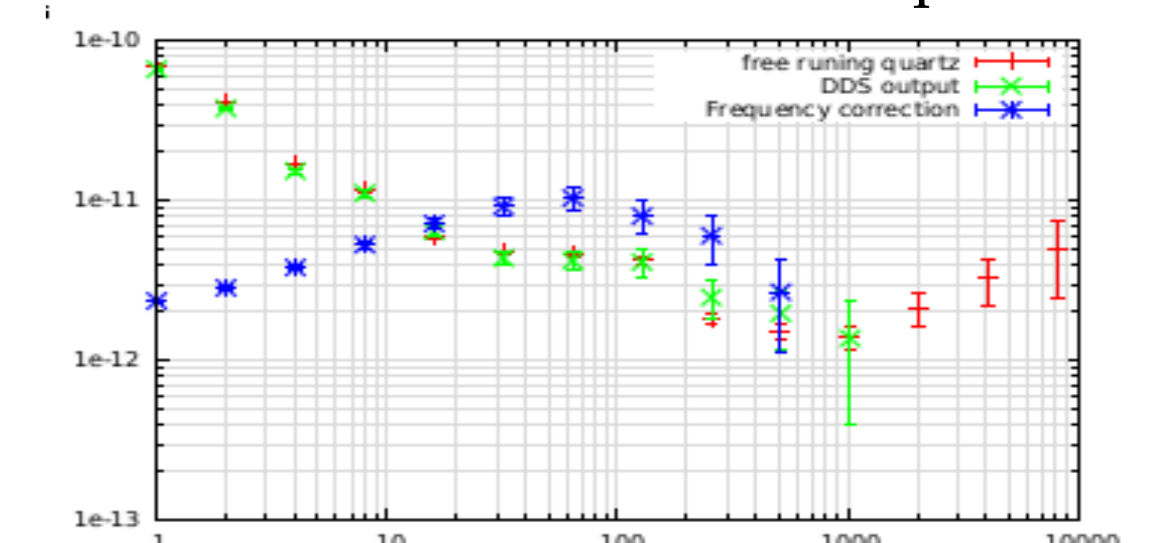


## A DDS-based phase and frequency tracking system



- DUT & DDS are maintained in quadrature
- The controller tracks the phase and frequency
- A low-cost experiment (Redpitaya or Zedboard with LTC2158, AD9915 eval board) provides easily 3 ms phase tracking and 0.7 s frequency rates
- Prefiltering stages within FPGA (e.g. Box car with 2<sup>18</sup> averages lead to a time constant of 2 ms)
- Servo implemented either realtime or userspace depending on chosen sensitivity (allows for saving ressources).

For the sake reconfigurability and ease development, we present here simple tests on medium quality quartz oscillator while data analysis is performed through the embedded CPU unit. Concurrent RAM transfert and calculations benefits from multithreaded techniques



- Red : spare free-running quartz oscillator (meas : HP53132A)
- Green : stability measurement at DDS output
- Blue : frequency correction calculation

