

New PLL - Texas Instruments LMK5C33216

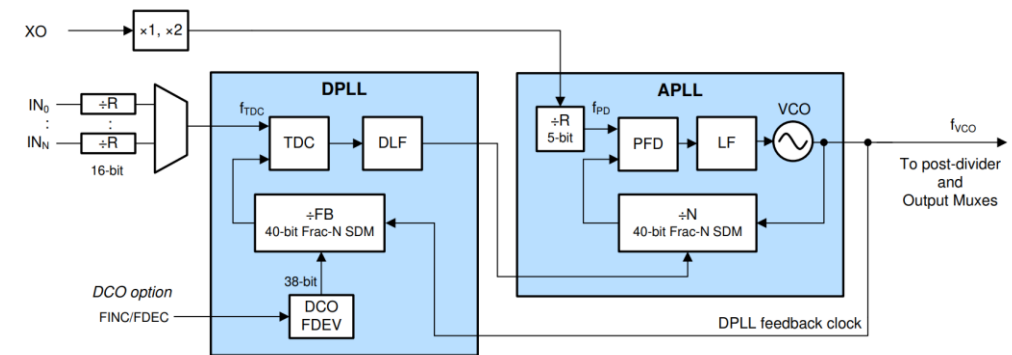
Sophie B. / Eduardo M. – 27/06/2022

Overview

- PLL overview
- Phase-noise
- Phase-determinism
- Next steps

PLL overview

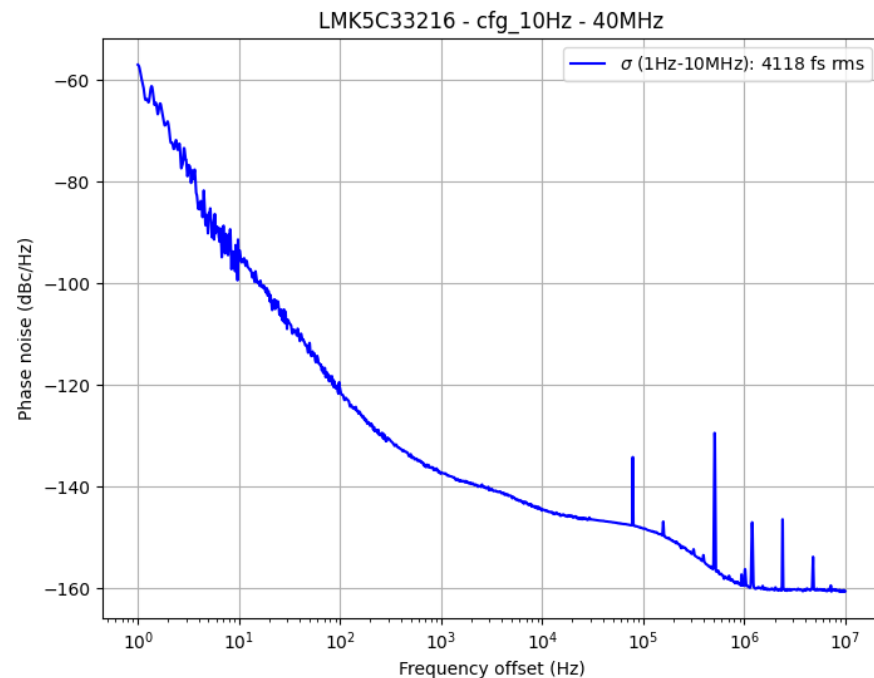
- Part name: [LMK5C33216](#)
 - Recommended by user **Michail Bachtis** from CMS
- Number of outputs: 16
- Zero-delay-mode is possible
- Configurable bandwidth (can be lower than 10Hz and higher than 1kHz)
- GUI for configuration: not so simple to configure!
- For all the tests here, the reference used is the HPTC



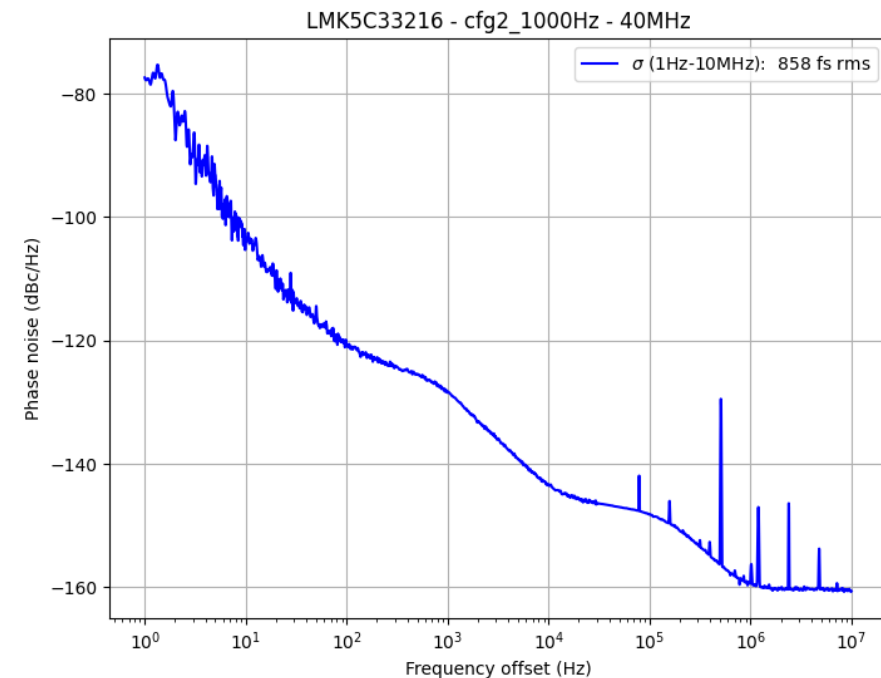
Phase-noise

- A good compromise when used as a back-end jitter cleaning is 1kHz BW
 - As a reference: Si5345 sigma $\sim 0.7\text{ps}$

10Hz – Too Low



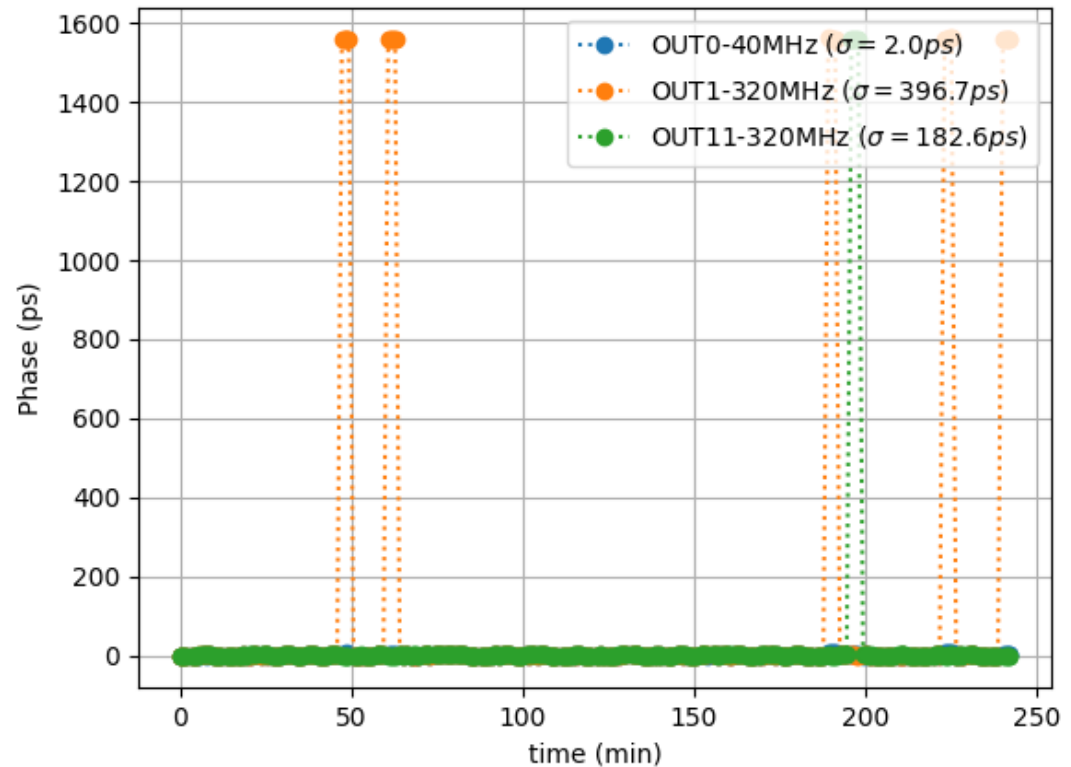
1kHz – Good compromise



Phase-determinism

- Reconfigure PLL and perform a soft reset every 5 measurements

Observed jumps in the outputs
which are not the ZDM (OUT0)



Phase-determinism

- Output sync functionality

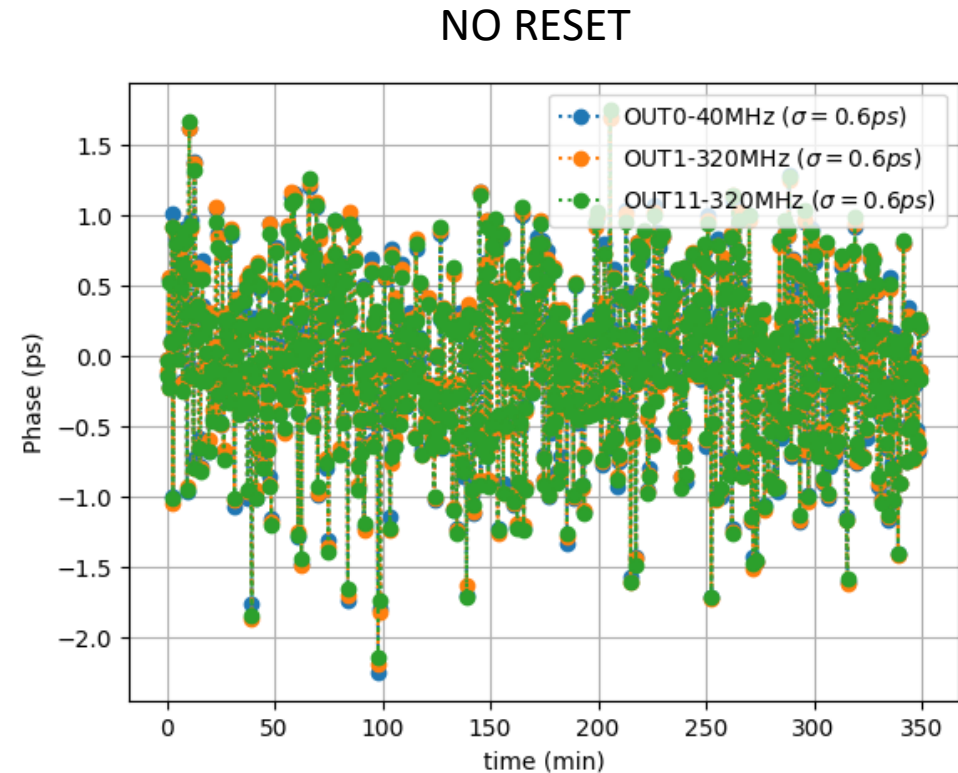
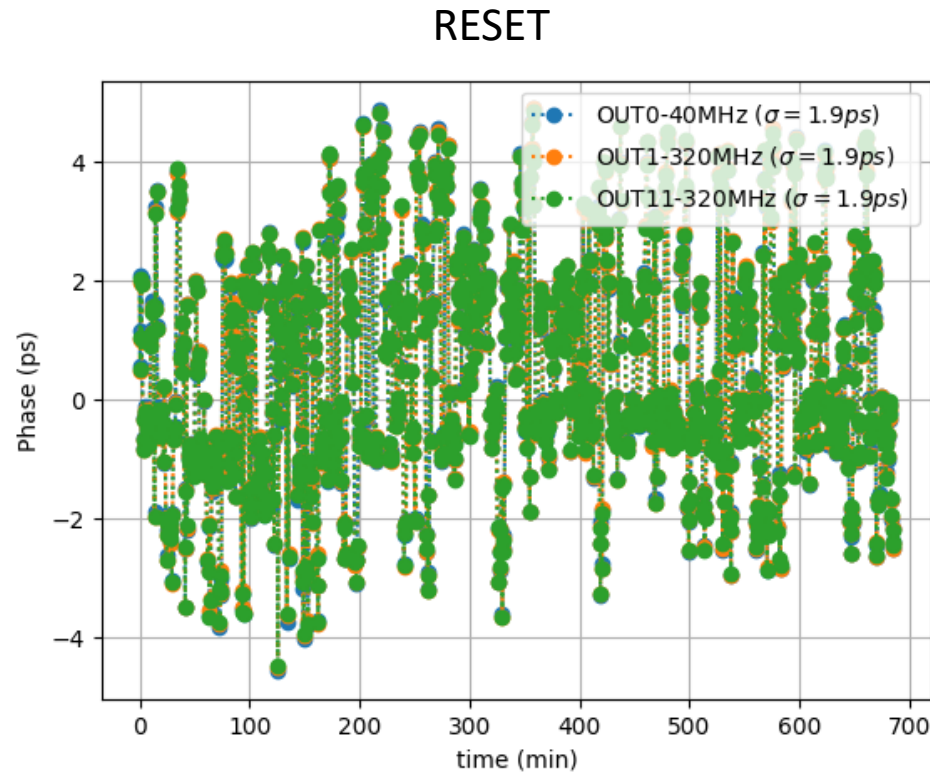
9.3.17 Output Synchronization (SYNC)

Output SYNC can be used to phase-align two or more output clocks with a common rising edge by allowing the output dividers to exit reset on the same PLL output clock cycle. Any output dividers selecting the same PLL output can be synchronized together as a SYNC group by triggering a SYNC event through the hardware pin or software bit.

- Let's repeat the test by performing a SYNC after each reset...

Phase-determinism (RESET + SYNC)

- No major jumps observed (SYNC works as it should...)
 - As a reference, for SI5345, this test we have p-p < 5ps



Next steps

- Test on phase-determinism over a temperature range
- This is the ultimate test to confirm if the part is really suitable for our HPT applications
- Unfortunately I have been having a GUI loading problem since months that are preventing me to further work with the part

Conclusions

- Good performance
- Phase-determinism on temperature still missing
- Some challenges though:
 - Configuration software very complex
 - Problem with software and support not very effective