



Drift Calibration Module (DCM)

LLRF Collaboration Workshop

DCMS, Łódź, 08.08.2012

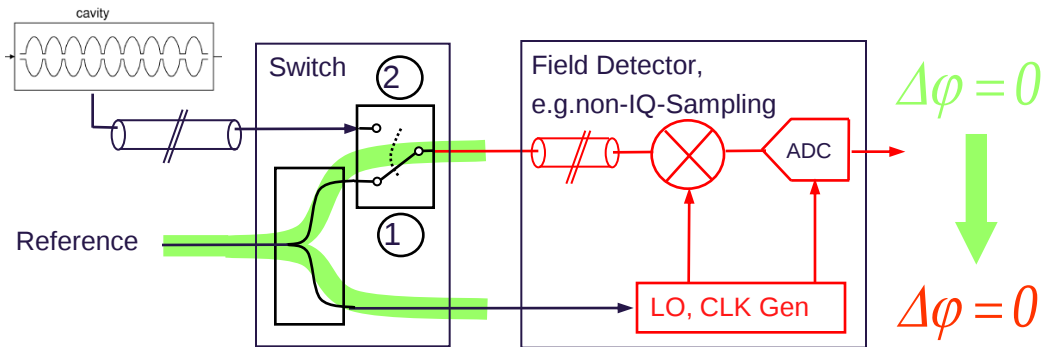
Jan Piekarski

ISE/WUT

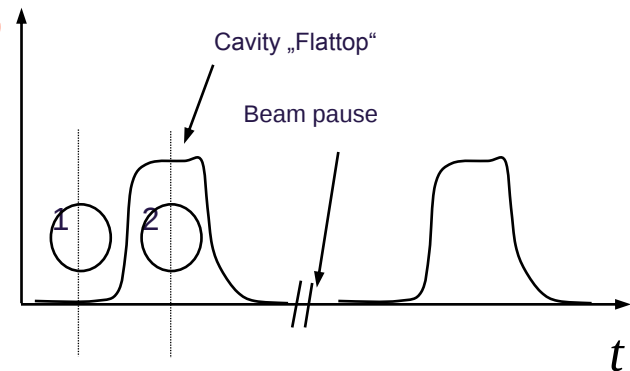
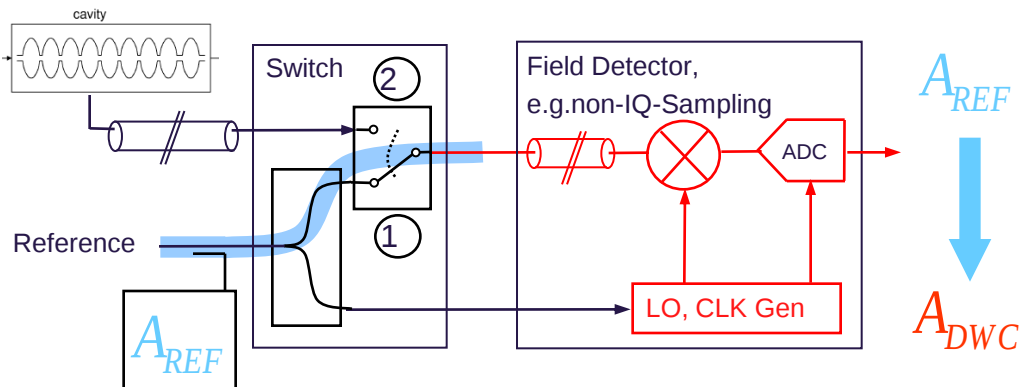


Reference Injection

Relative Phase Calibration :

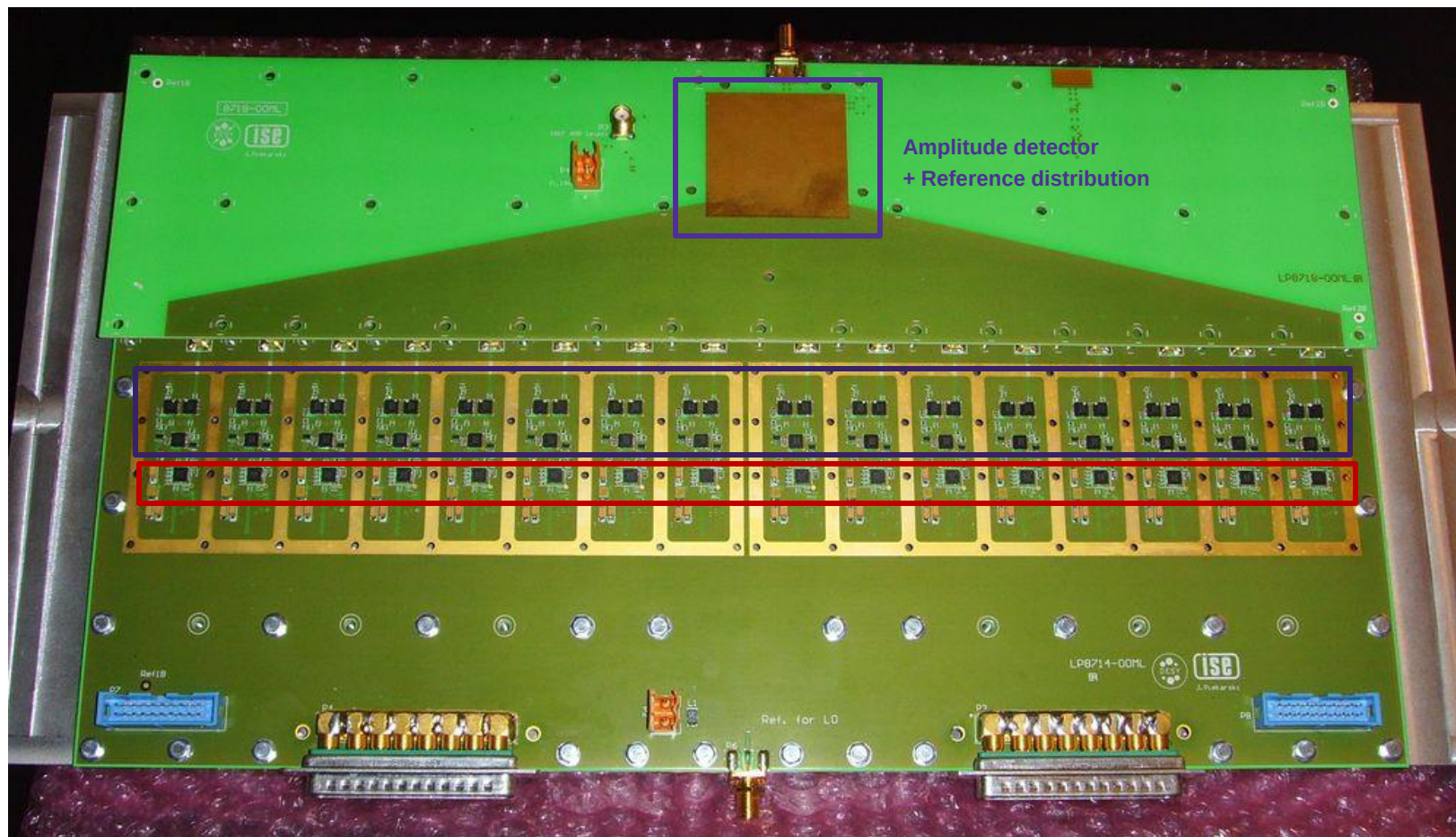


Absolute Amplitude Calibration :



It will calibrate also microphonic effects (cables and connectors)

Bottom view



Stable reference

Amplitude detector
+ Reference distribution

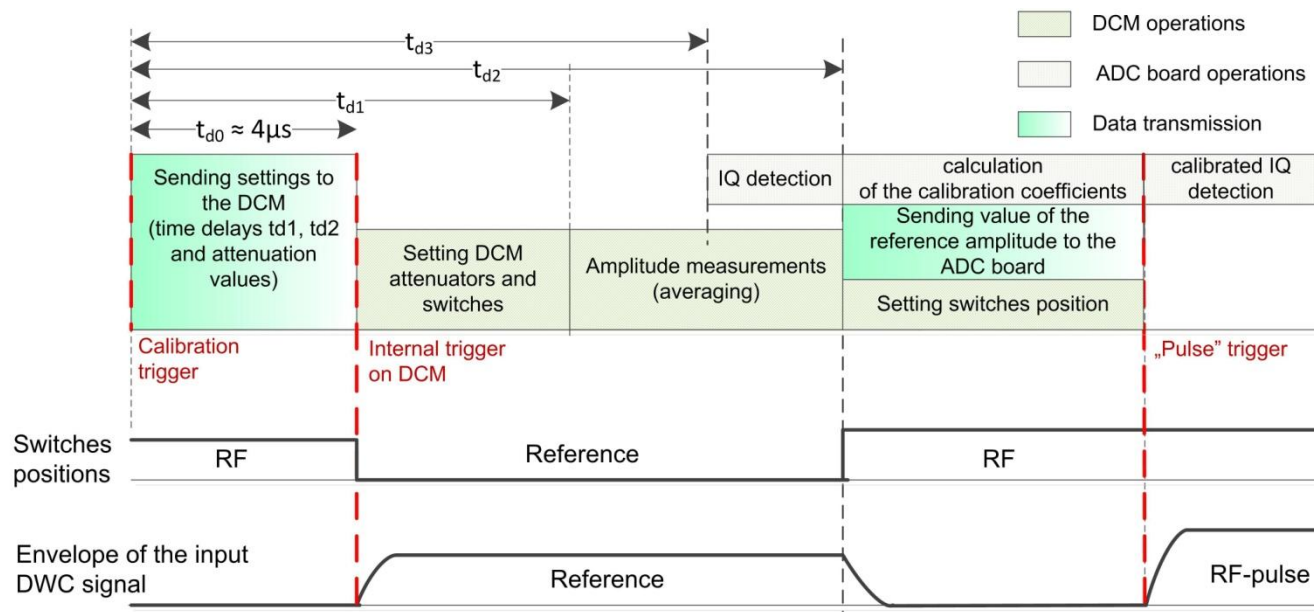
8xFBM to RTM DWC

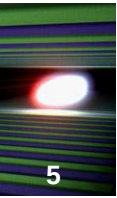
Ref for LOGM

8xFBM to RTM DWC

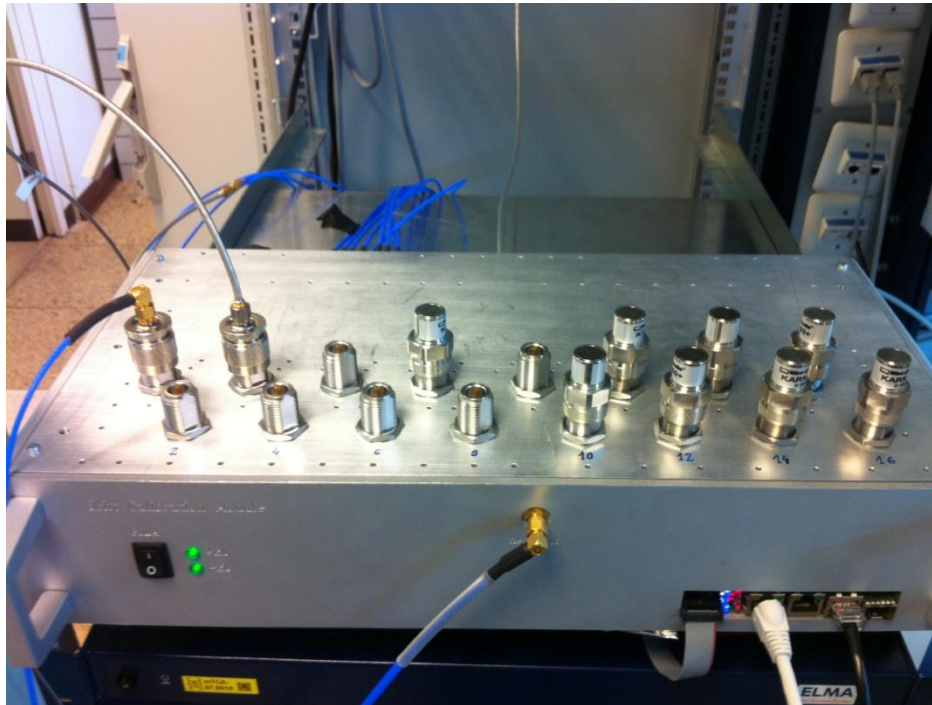
Software/ firmware status

- Timing, TMCB firmware, list of DCM registers – done

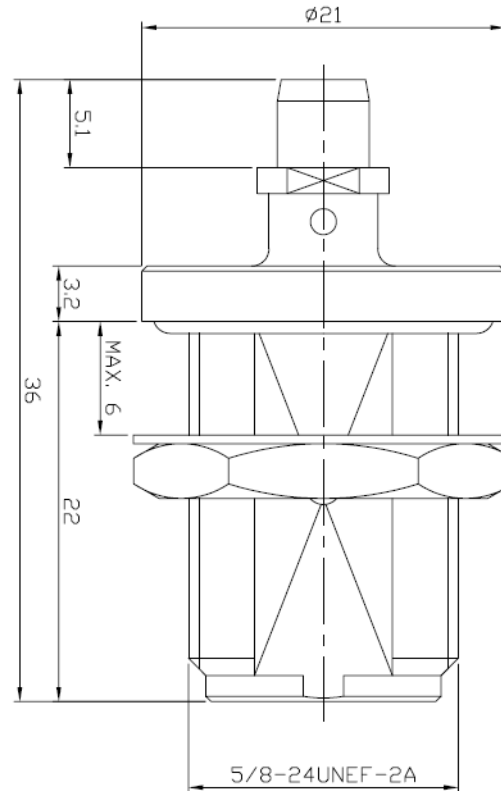


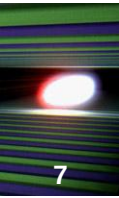


Mechanical status – review is needed to reduce the cost of assembling



New N-type connectors with integrated attenuators





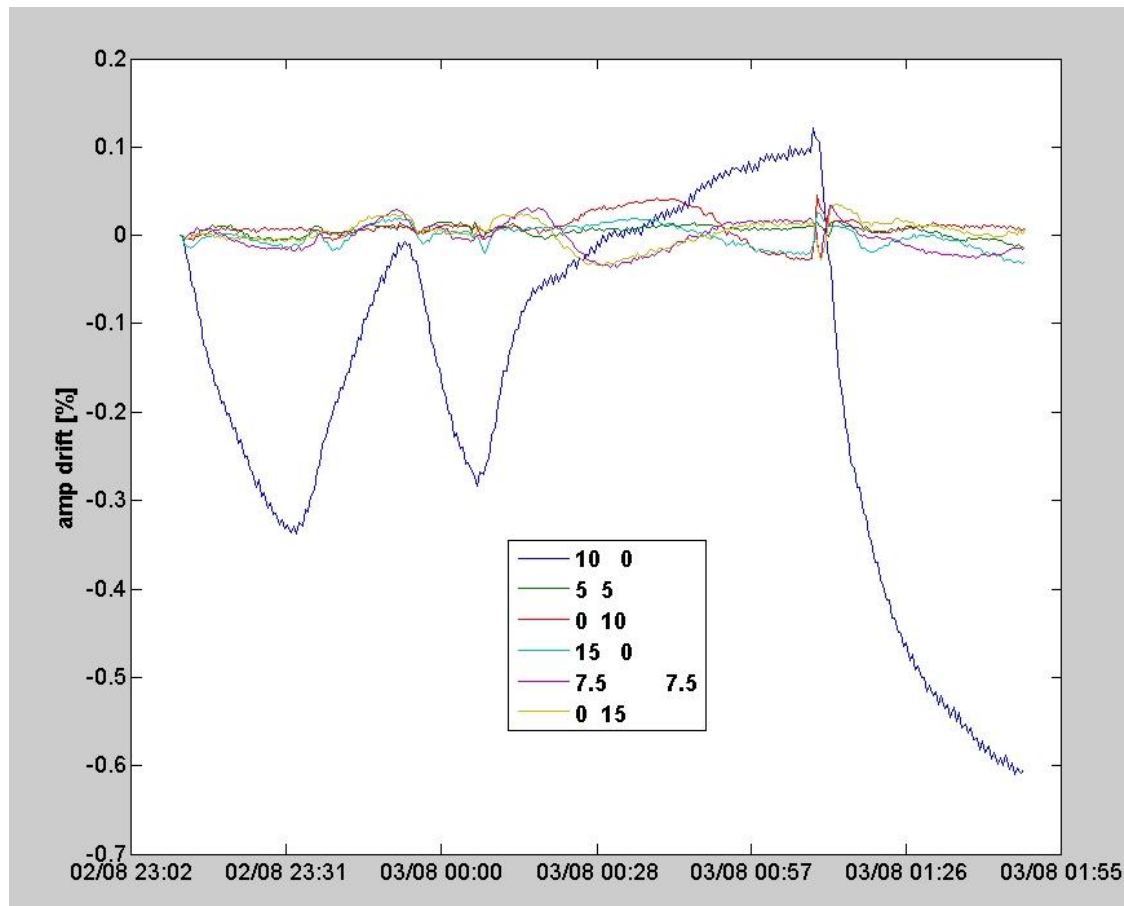
Main problems solved:

Reducing of crosstalks:

- RF-RF crosstalks are below -80db
- REF-RF crosstalks below -105 dB

Other problems to solve:

- Temperature controller
- Amplitude detector to check (noise and accuracy), optimize averaging time

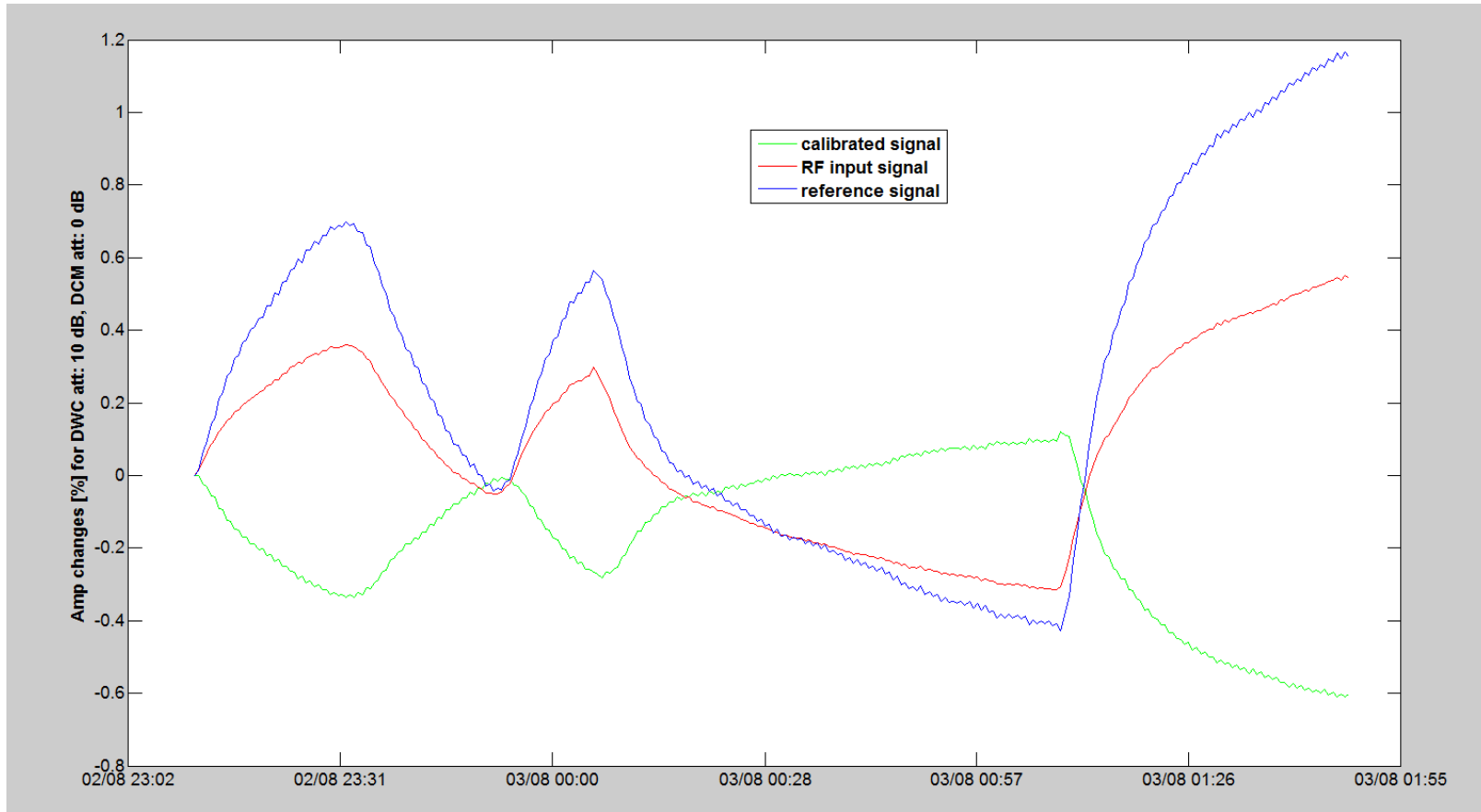


$$\begin{aligned}
 G_T &= \frac{1 - |\Gamma_G|^2}{|1 - \Gamma_{in}\Gamma_G|^2} |S_{21}|^2 \frac{1 - |\Gamma_L|^2}{|1 - S_{22}\Gamma_L|^2} \\
 &= \frac{1 - |\Gamma_G|^2}{|1 - S_{11}\Gamma_G|^2} |S_{21}|^2 \frac{1 - |\Gamma_L|^2}{|1 - \Gamma_{out}\Gamma_L|^2} \\
 &= \frac{(1 - |\Gamma_G|^2) |S_{21}|^2 (1 - |\Gamma_L|^2)}{|(1 - S_{11}\Gamma_G)(1 - S_{22}\Gamma_L) - S_{12}S_{21}\Gamma_G\Gamma_L|^2}
 \end{aligned}$$

■ Phase-to-amplitude conversion problem because of mismatch

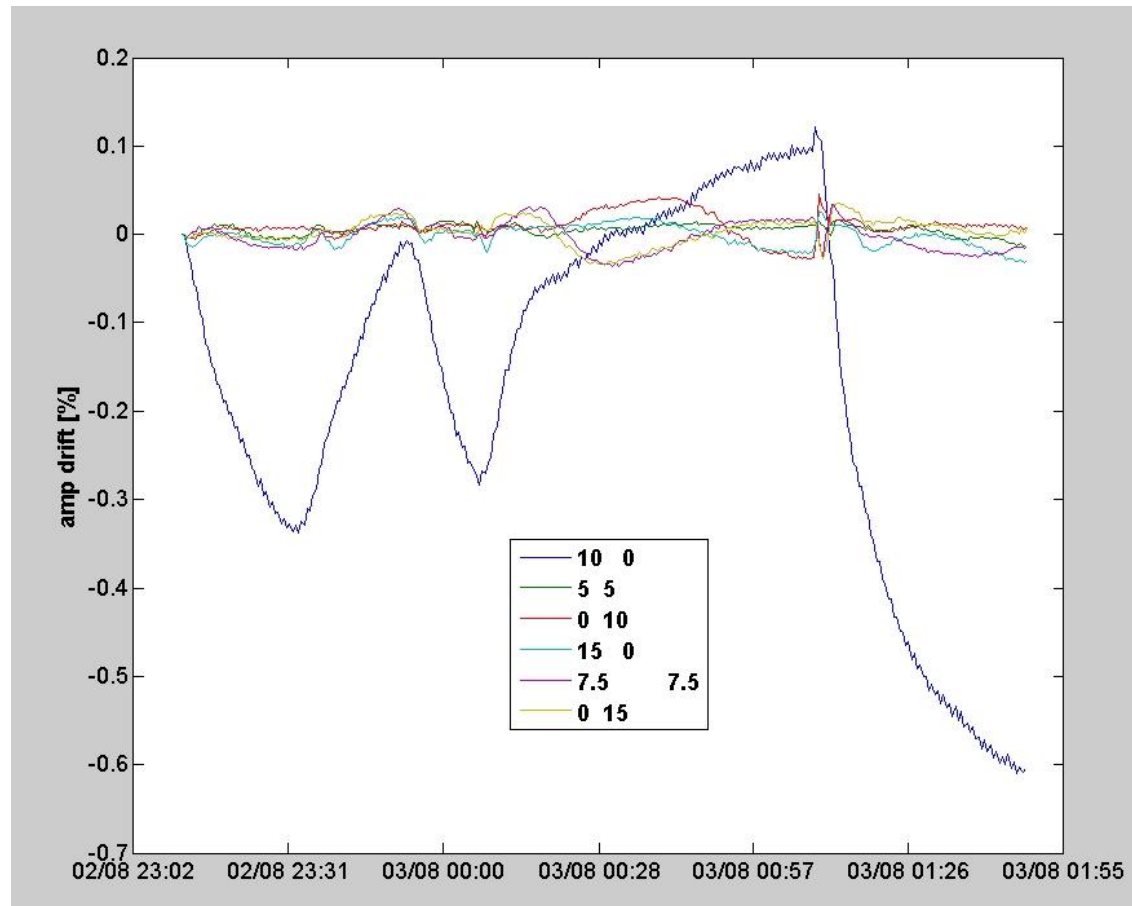
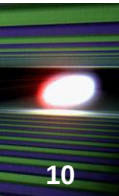
Results - amplitude

9



- Phase-to-amplitude conversion problem because of mismatch

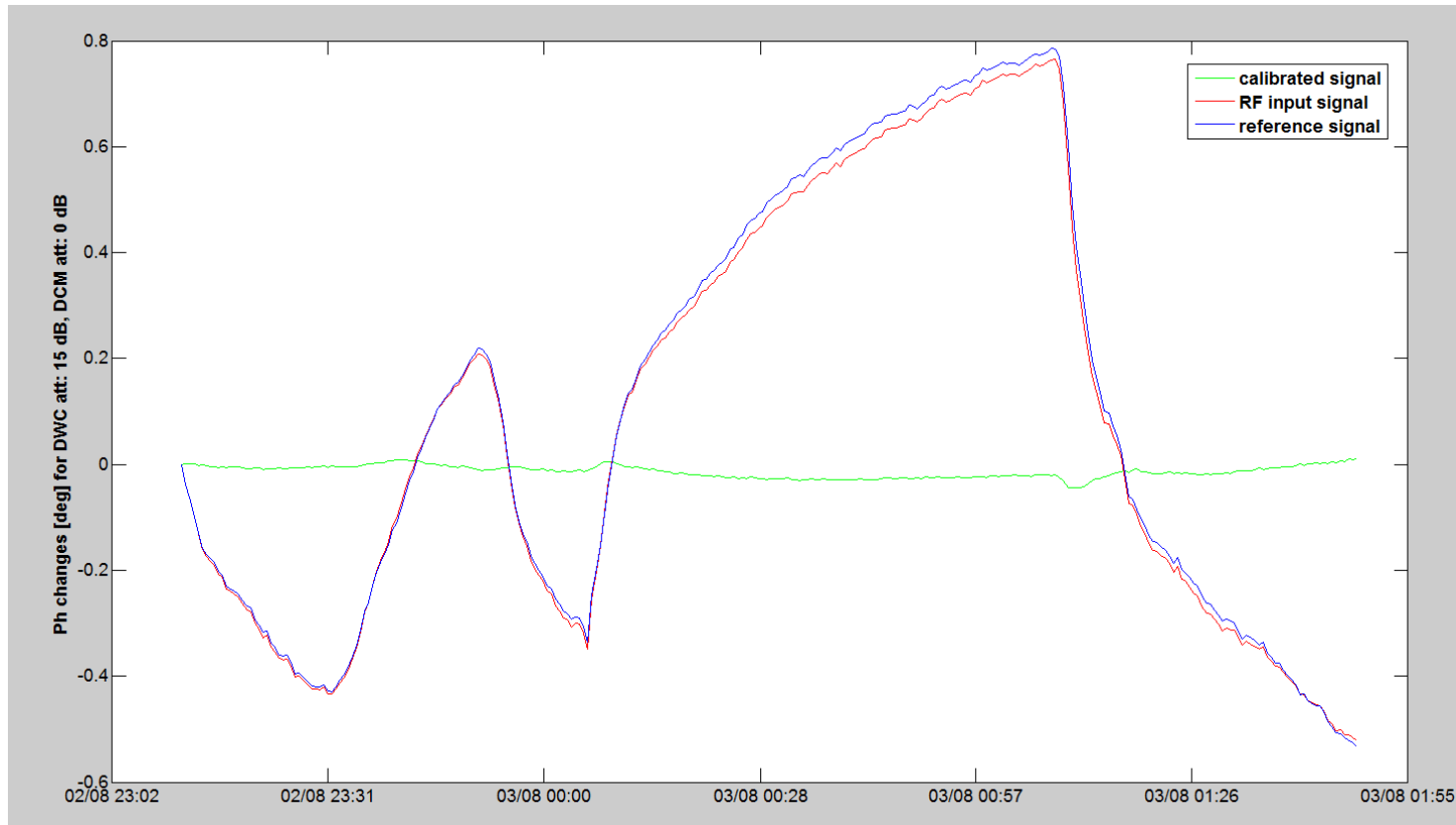
Results - amplitude



- Phase-to-amplitude conversion problem because of mismatch

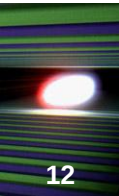
Results - phase

11



■ 0.06 deg peak-to-peak

DCM – conception needed to change?



1. Increase matching of DCM and DWC
 - difficult because there are not good integrated power splitter on the market -> distributed power splitters are needed
 - amplitude balance between channels to check
2. Conception with switches instead of power splitters