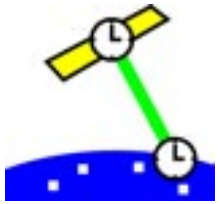

An Ultra-stable Event Timer

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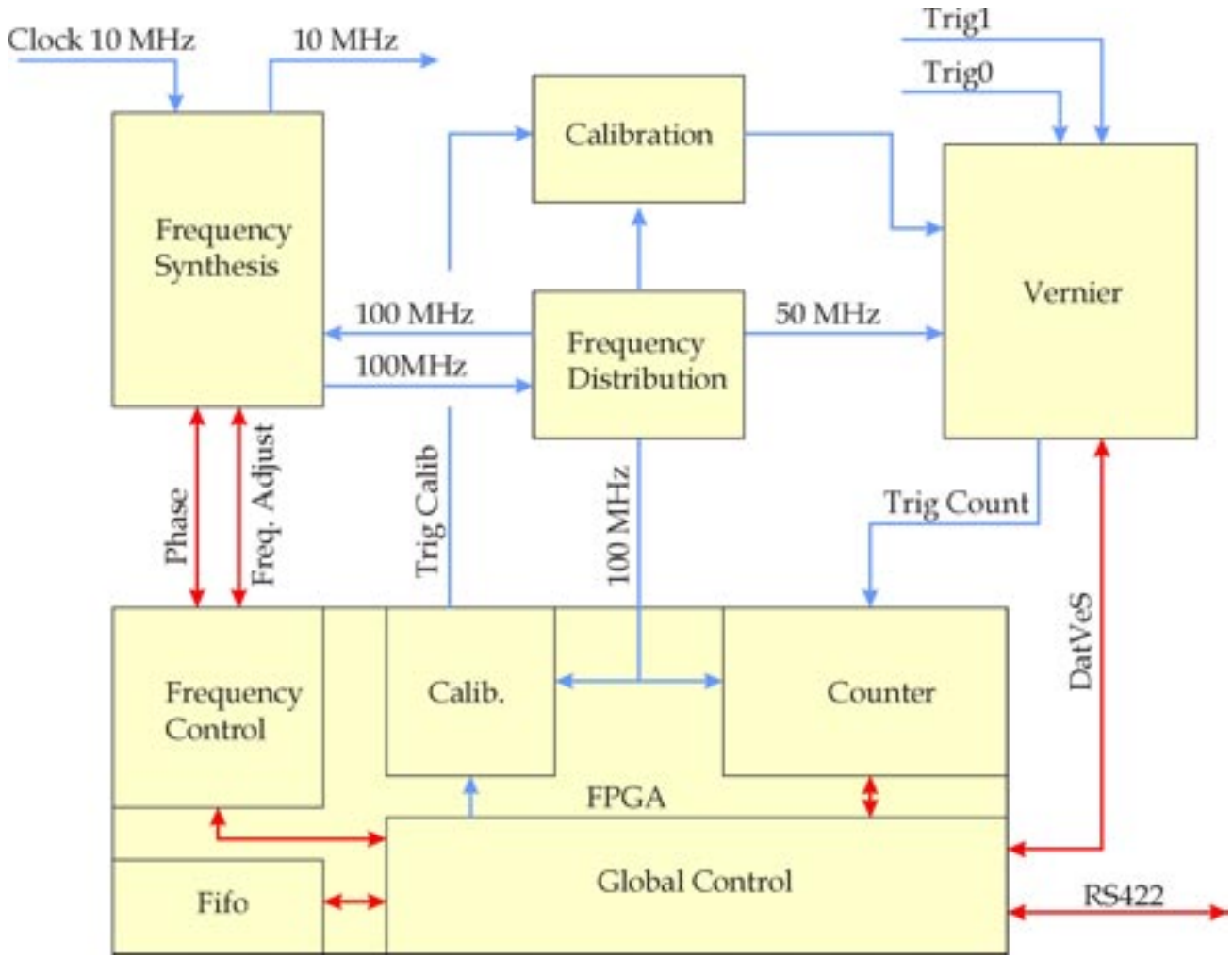
Characteristics

- Resolution: 1 ps
- Dynamic: 64 bits
- External Clock Frequency: 10 or 100 MHz
- Precision < 3 ps
- Linearity: 1 ps rms (+/- 1.5 ps)
- Dead time: 10 μs
- 2 independent channels
- 2 inputs per channel

Characteristics

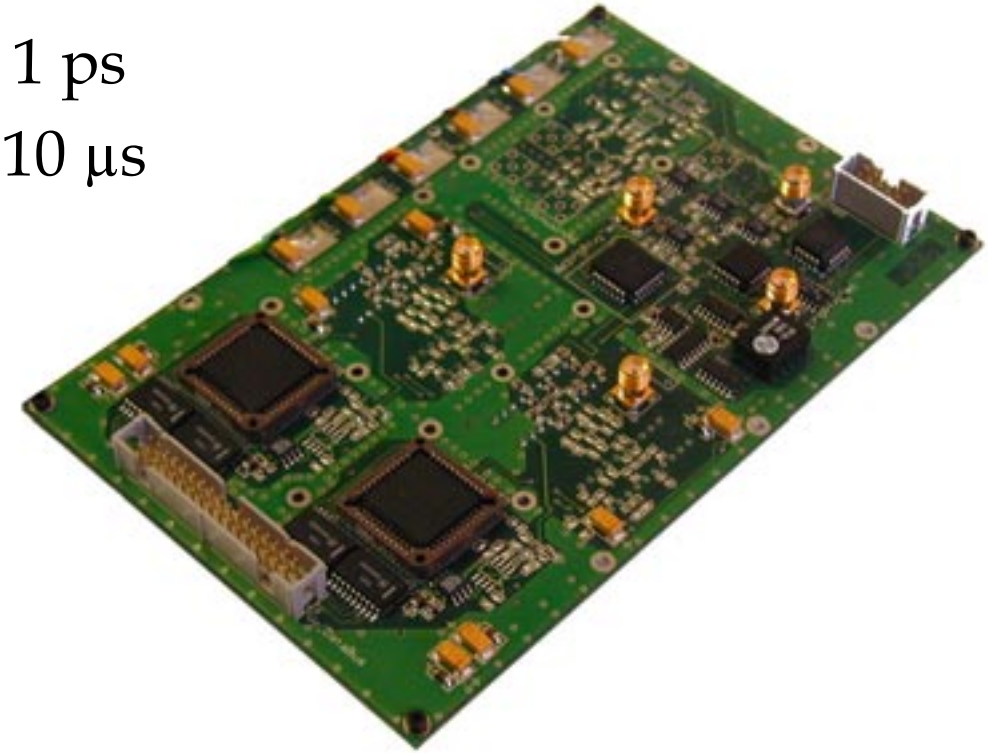
- Automatic internal calibration
- Internal memory: 10 000 measurements
- Interface: RS 422 @ 1 MBits
- Size: 19 inches rack 3U x 280 mm

OCA Event timer synoptic



2 vernier cards

- Frequency: 50 MHz
- Resolution: 1 ps
- Dead time: 10 μs

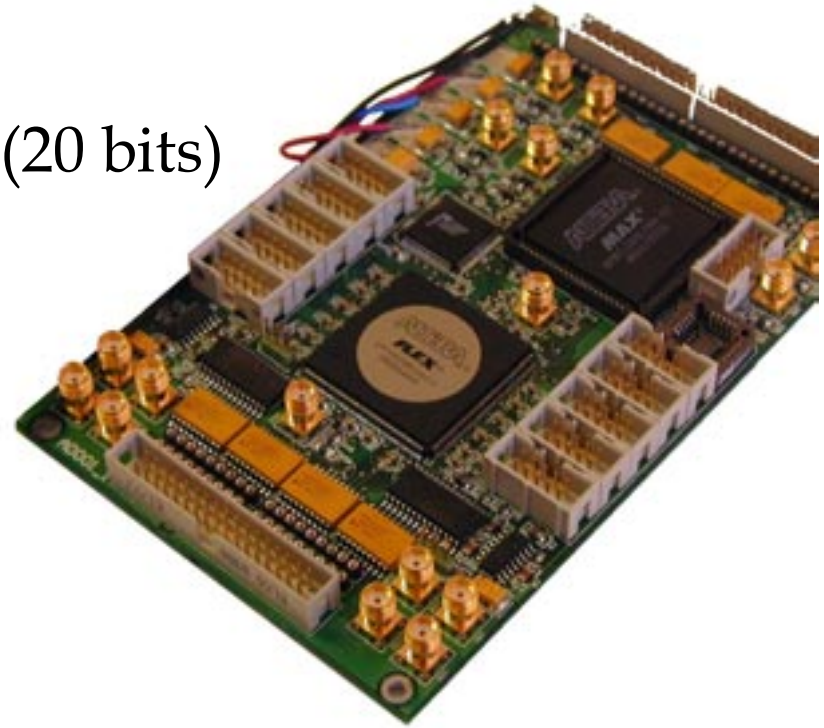


Frequency Synthesis card

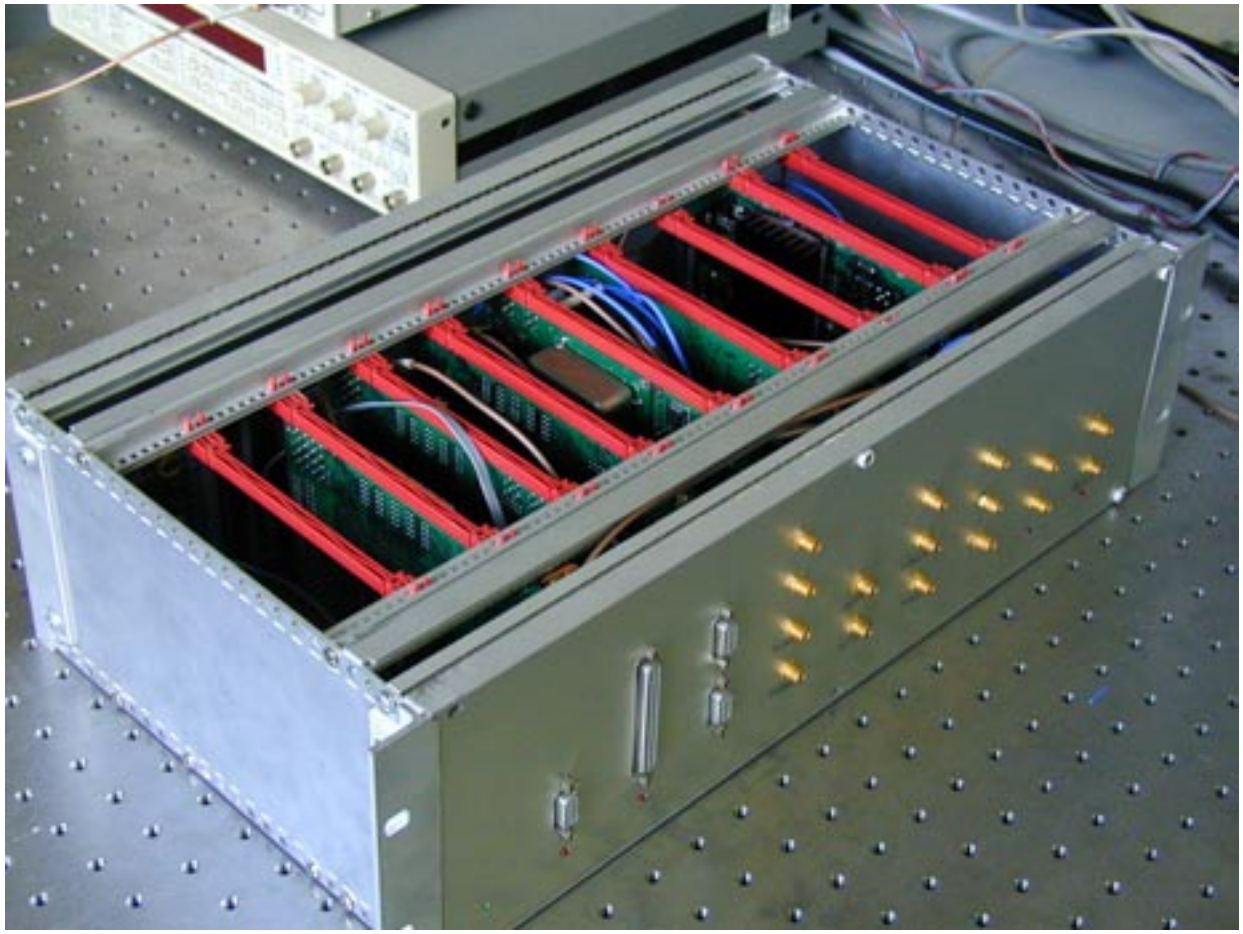
- Ultra low noise local oscillator @ 100 MHz
  - » Phase noise: 100 Hz : -130 dBc, 10 kHz : -165 dBc
- Digital phase lock loop: 20 bits
- Input frequency: 10 MHz
- Output frequency: 100 MHz and 10 MHz
- Thermal sensitivity < 100 fs/°C (10 to 30 °C)
- Calibration events

3 programmable cards

- Digital timer: 10 ns resolution
- Frequency synthesis control (20 bits)
- Global control
  - » Memory (10 000 events)
  - » 16 bits Analog to digital converter
  - » RS 422 serial interface

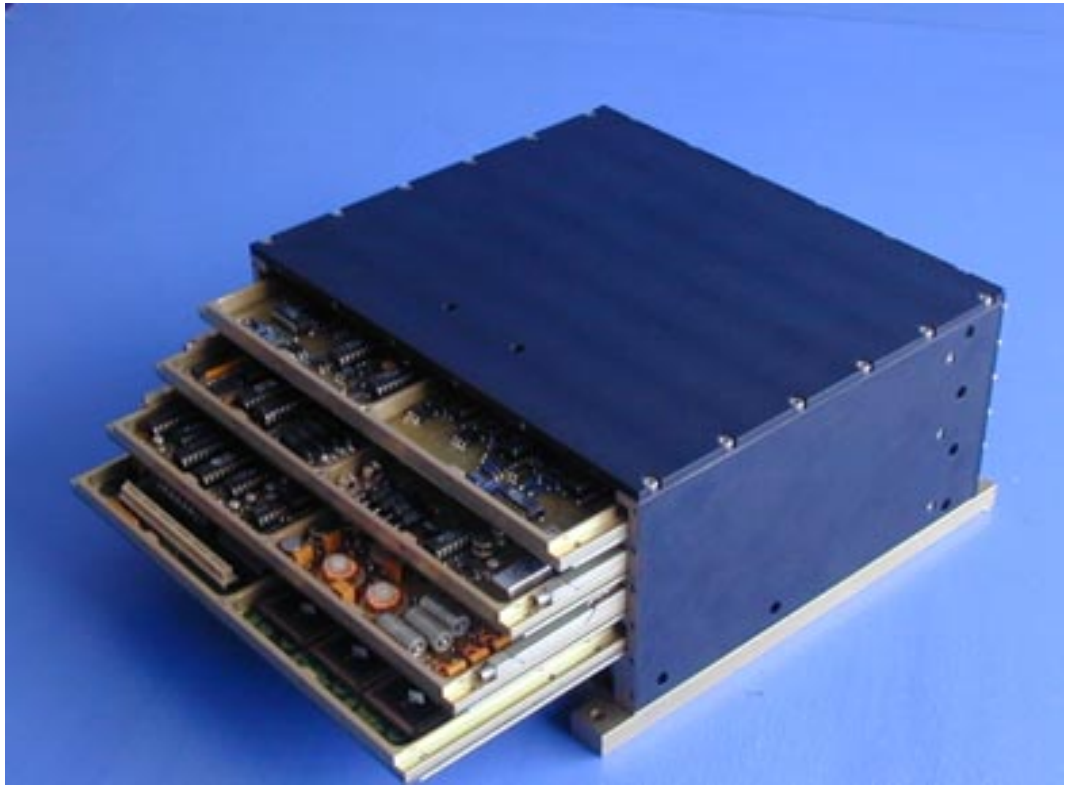


OCA Event Timer
Ground design

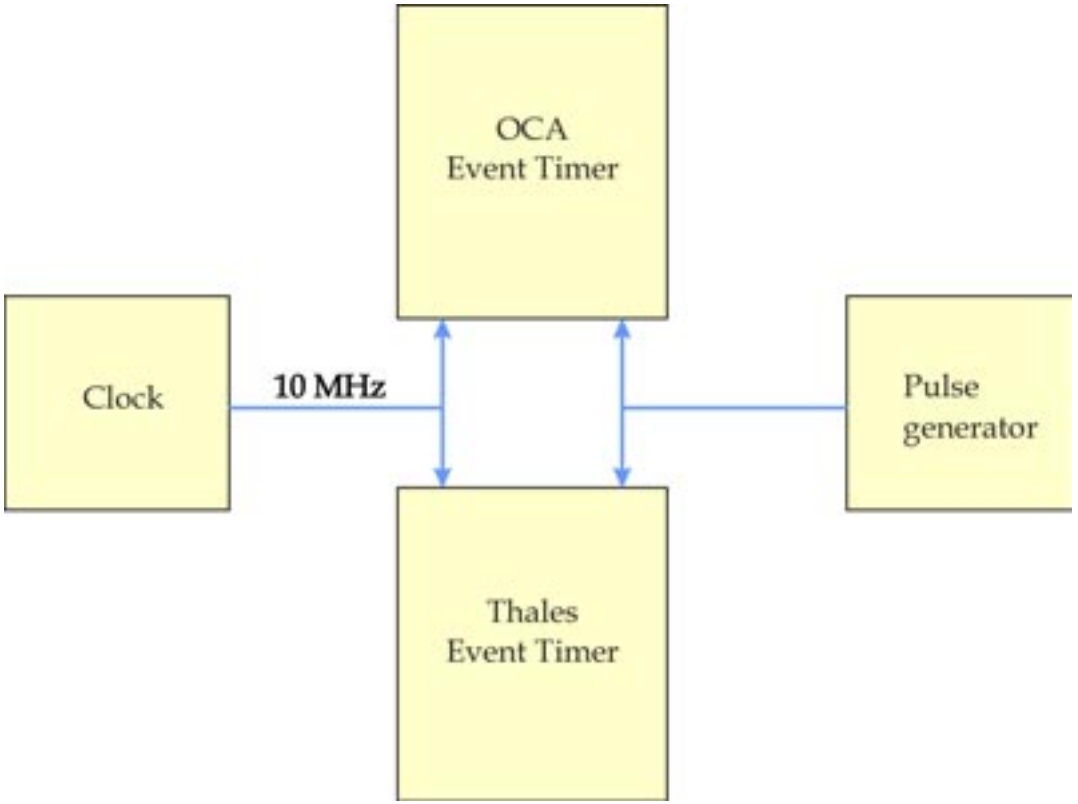


OCA Event Timer
Preliminary Space Design (EREMS)

- Mass: 7 kg
- Size: 250×240×130 mm^3
- Power: 40 W

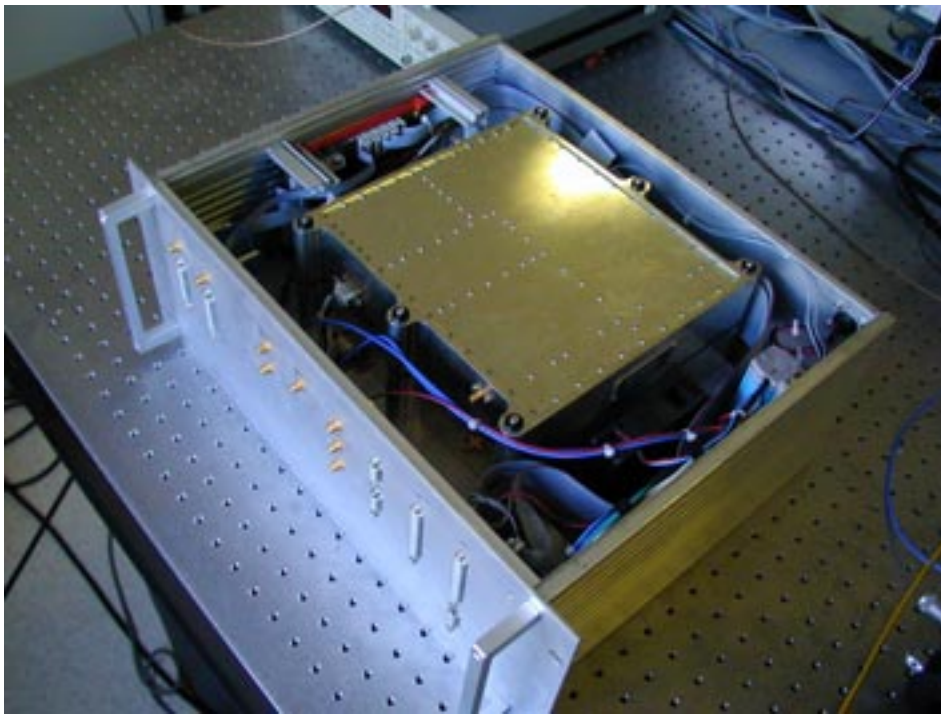


Asynchronous Test Bench

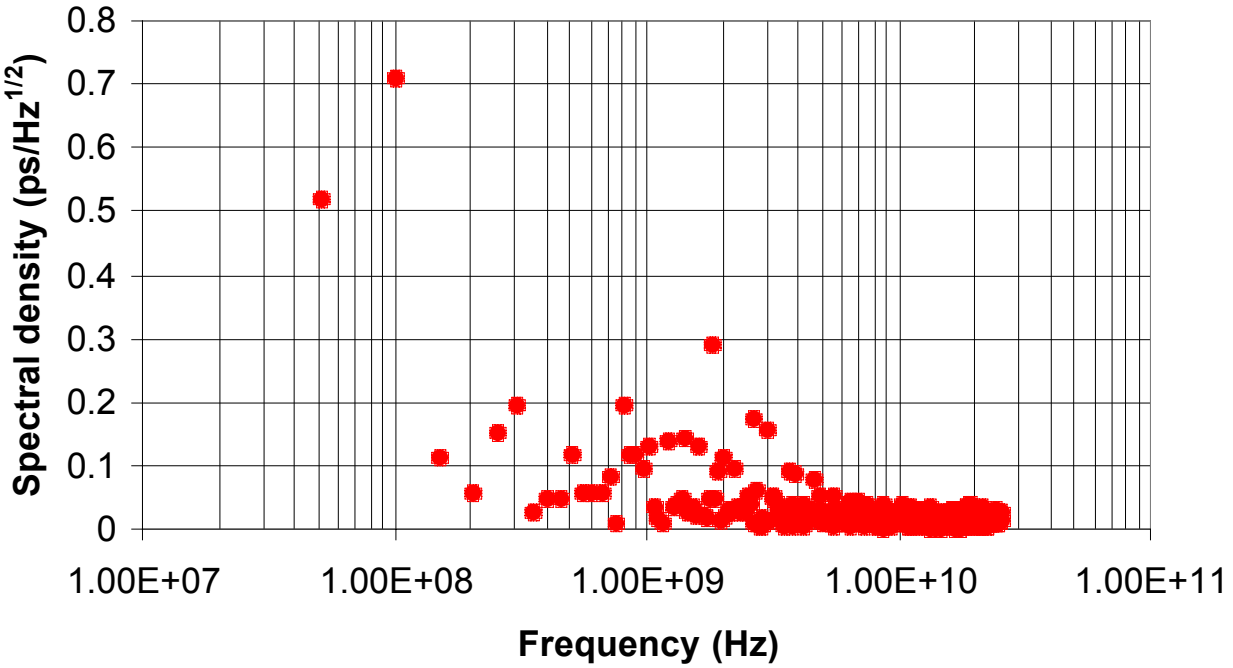


Thales Event timers

- 2 event timers (5 & 2 ps rms)
- 200 MHz frequency synthesis
- Global control
  - » Memory (10 000 events)
  - » 16 bits Analog to digital converter
  - » RS 422 serial interface

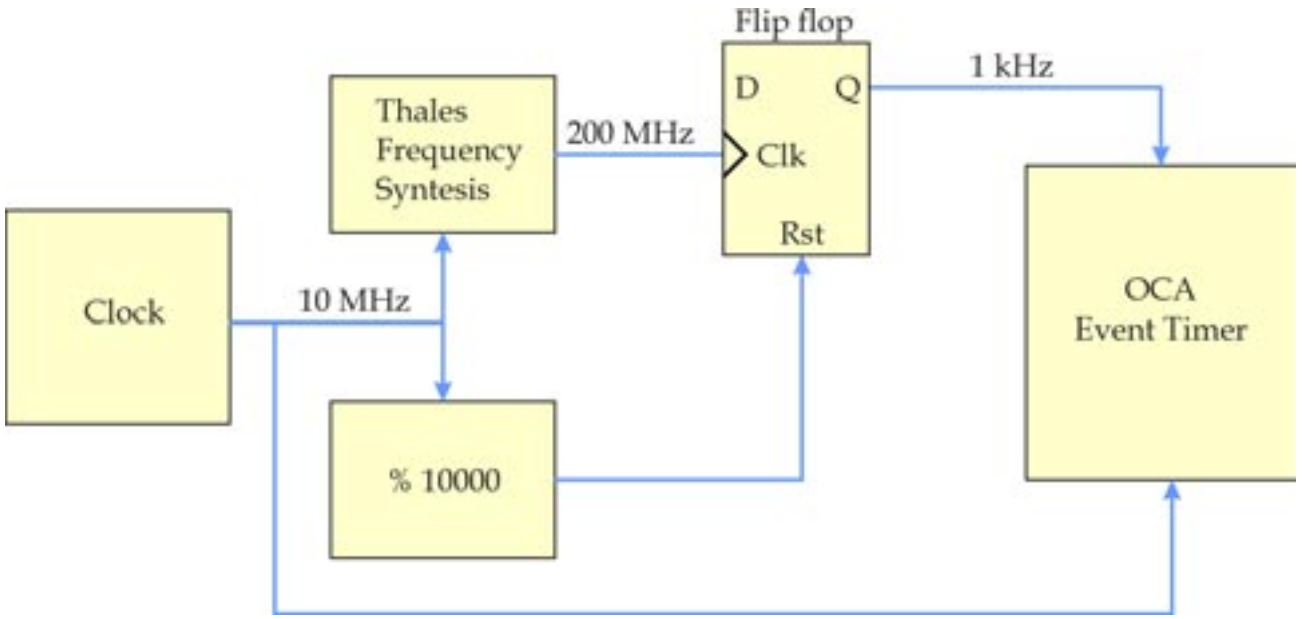


Spectral density of the vernier linearity error

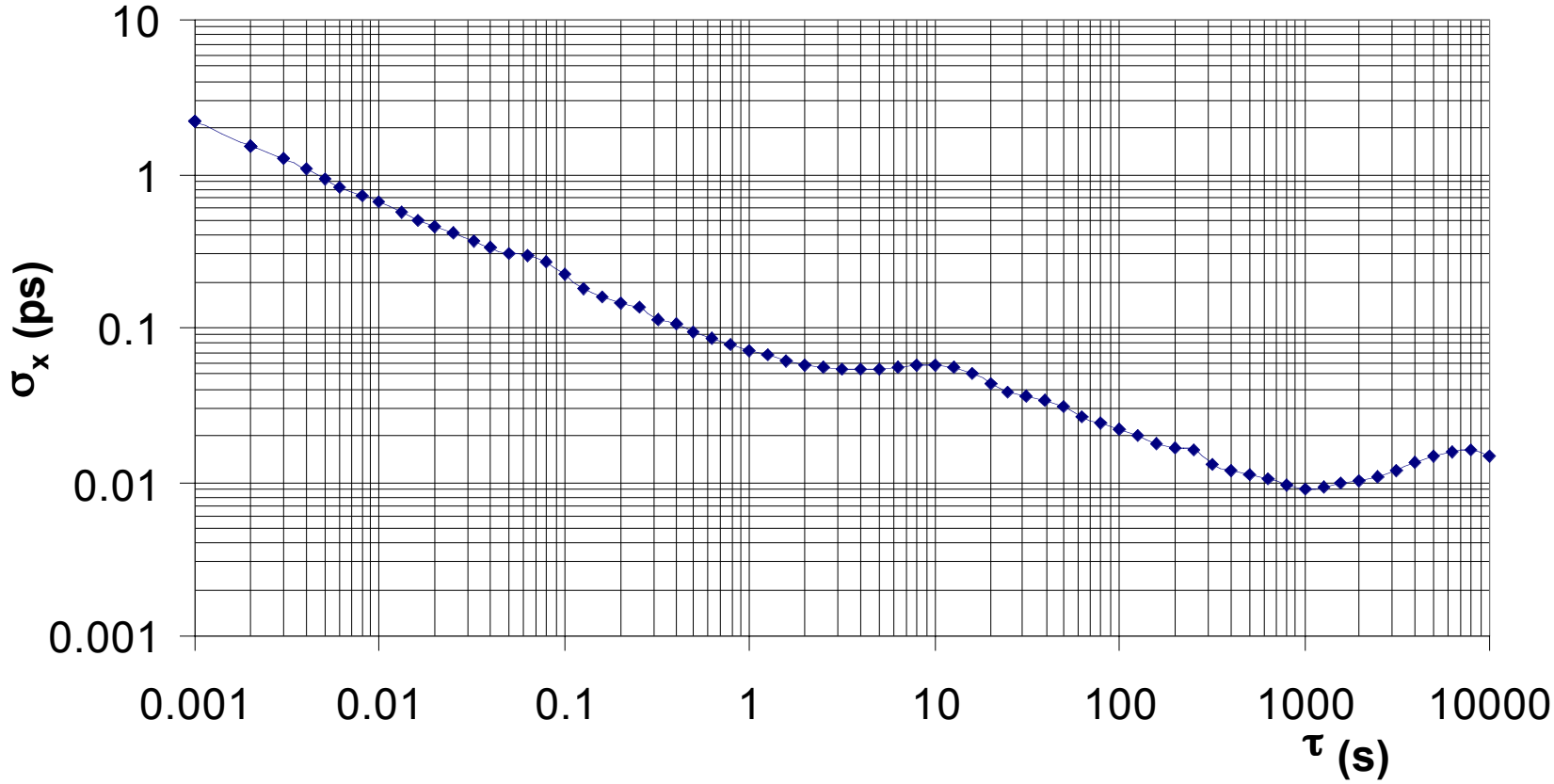


➡ Linearity: 1 ps rms, +/- 1.5 ps

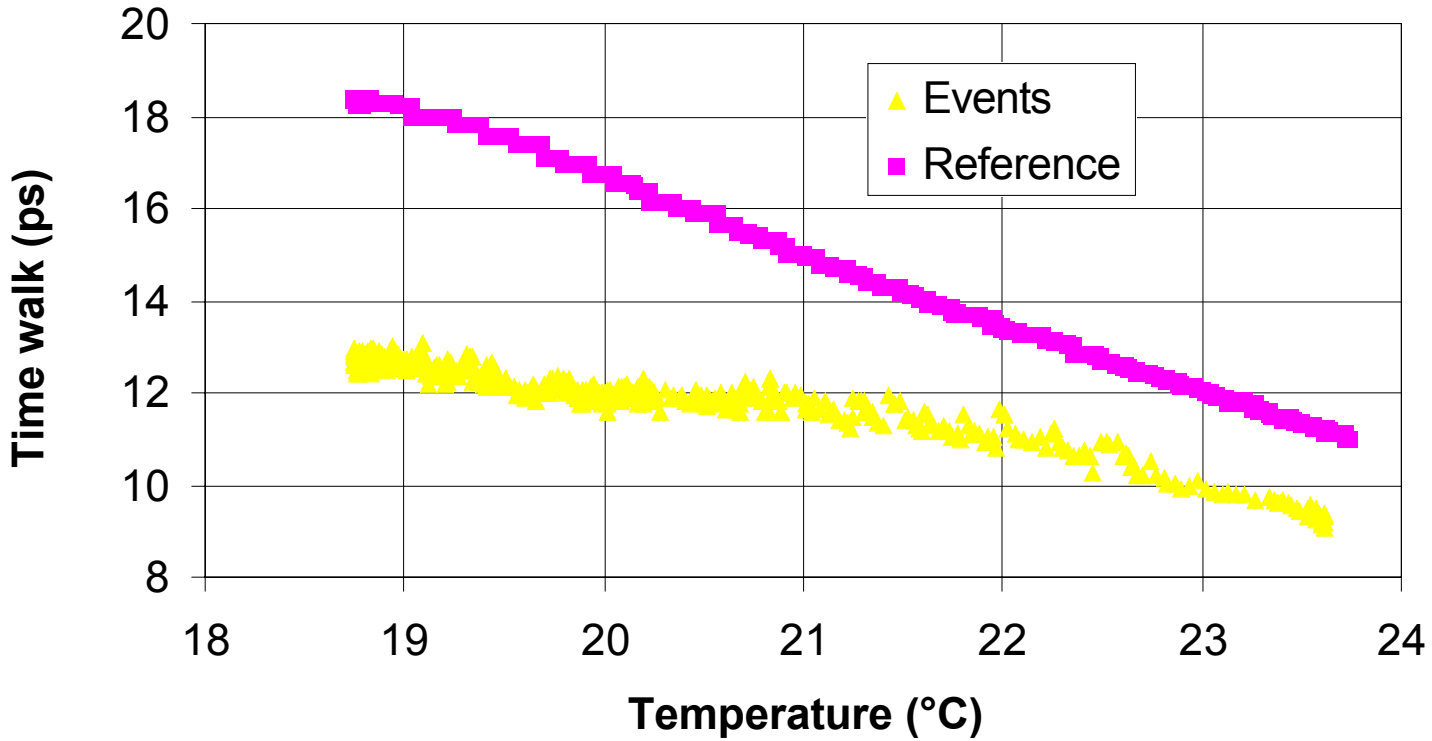
Synchronous Test Bench



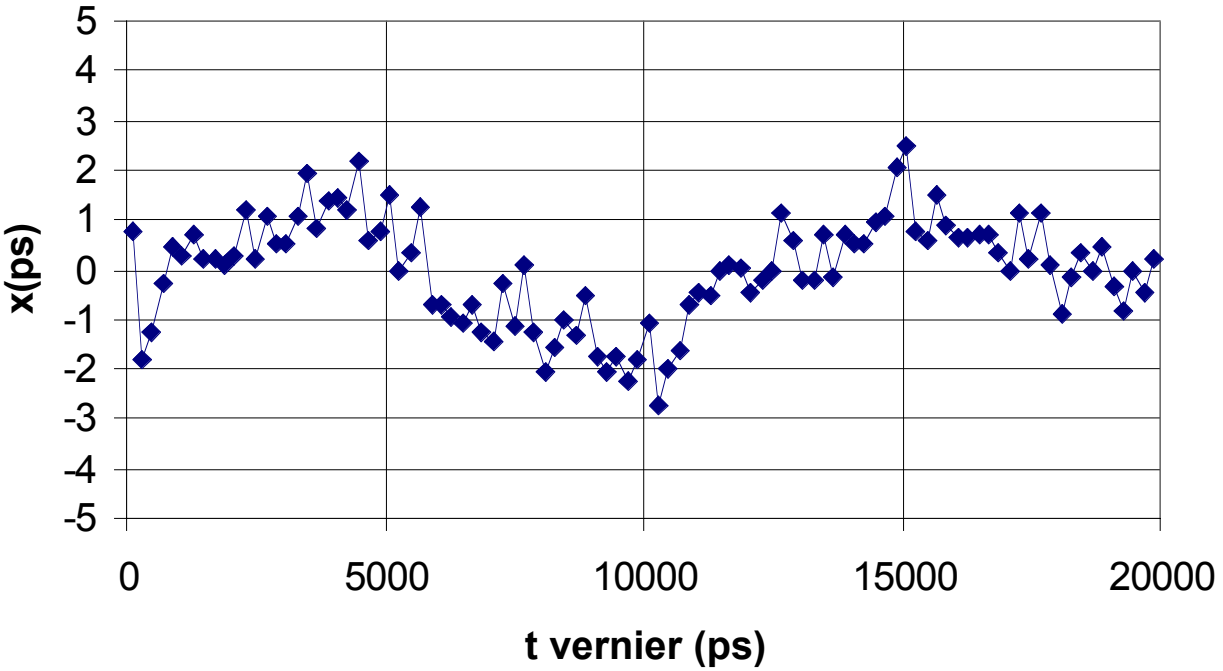
Time stability



Thermal sensitivity



Vernier linearity



➡ Linearity : 1 ps rms, +/- 1.5 ps