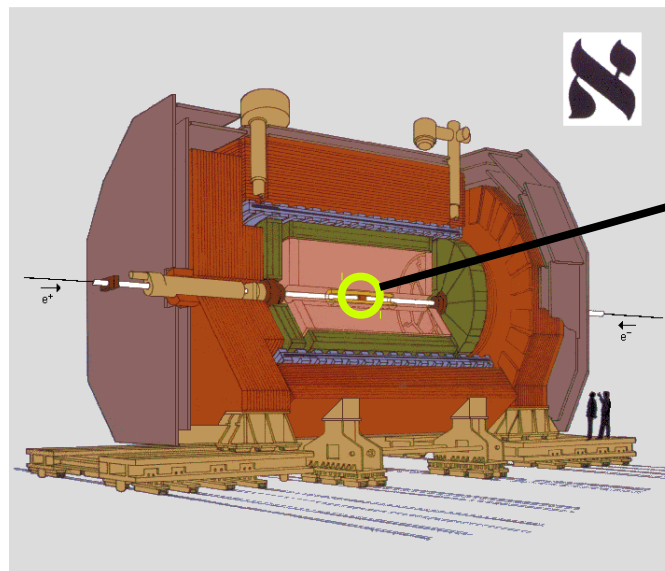# Alfredo Tomasini Ph.D

My carrier

- R&D (particles physics and CIS)

- Consumer products

- Standard products

- Test and production
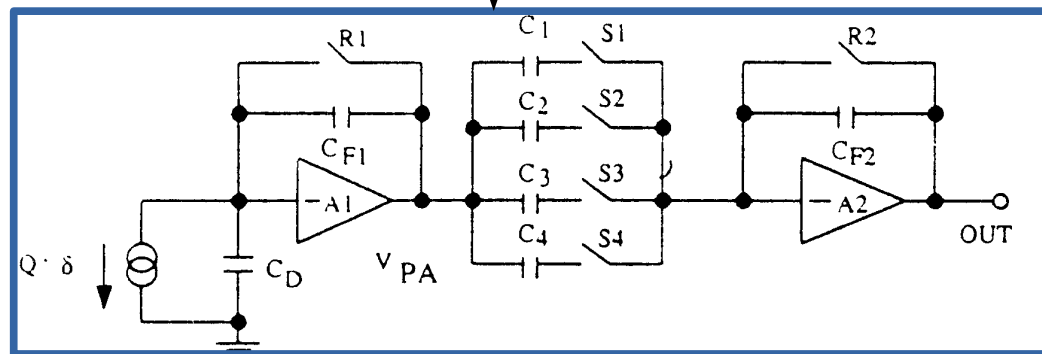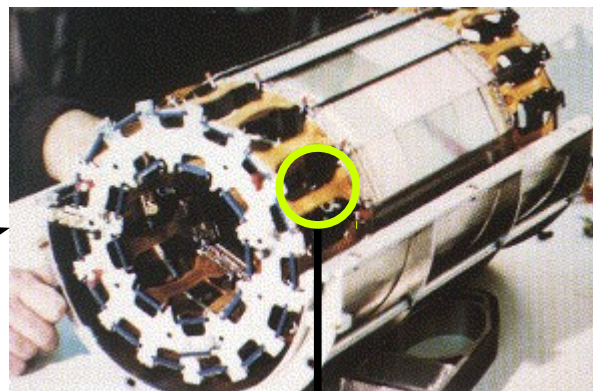
R&D Aleph CERN 1989-1993 (Ph.D)
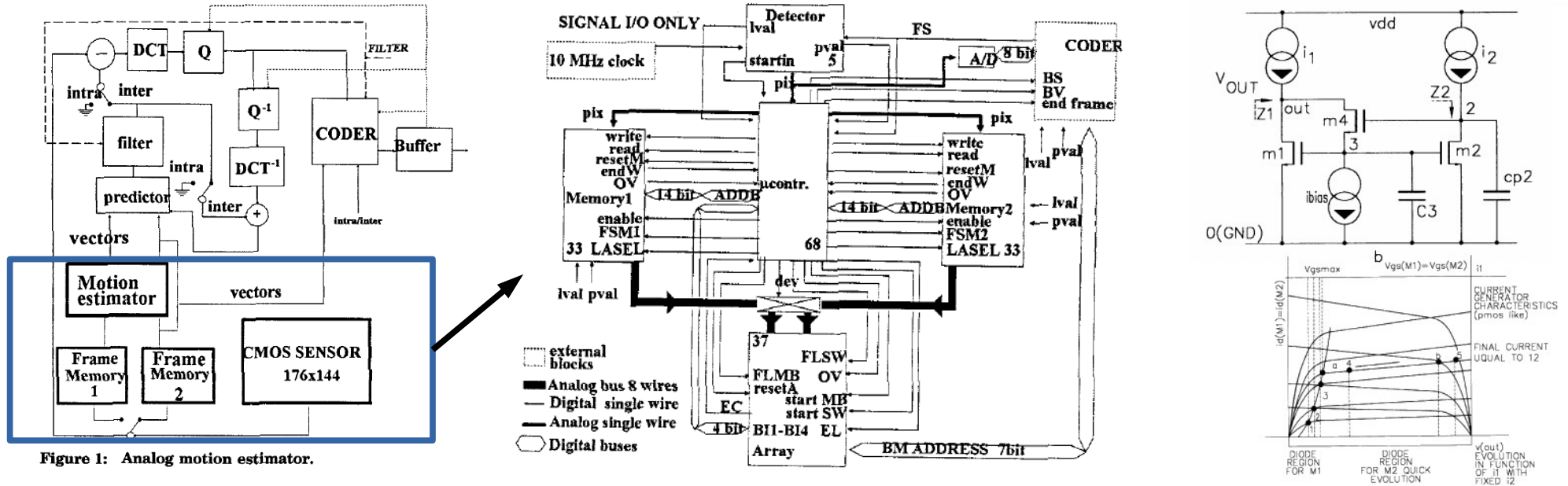
- Radiation Hard Electronics Jamex64

Vertex Detector

Inner Tracking Chamber

Time Projection Chamber

Electromagnetic Calorimeter

Superconducting Magnet Coil

Hadron Calorimeter

Muon Chambers

Luminosity Monitors

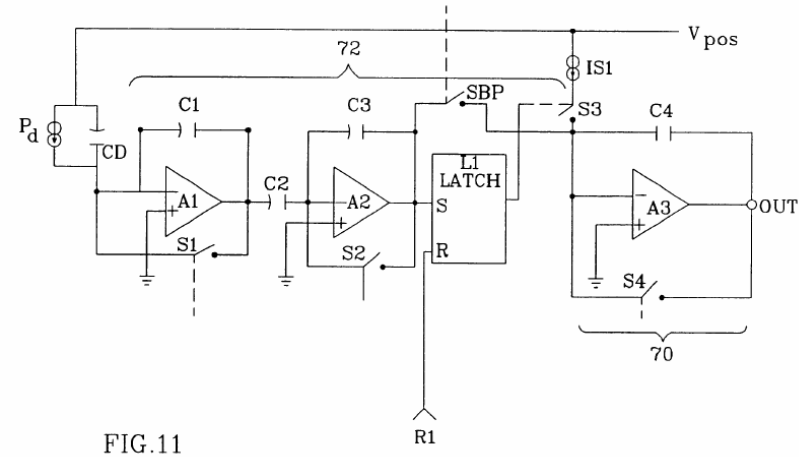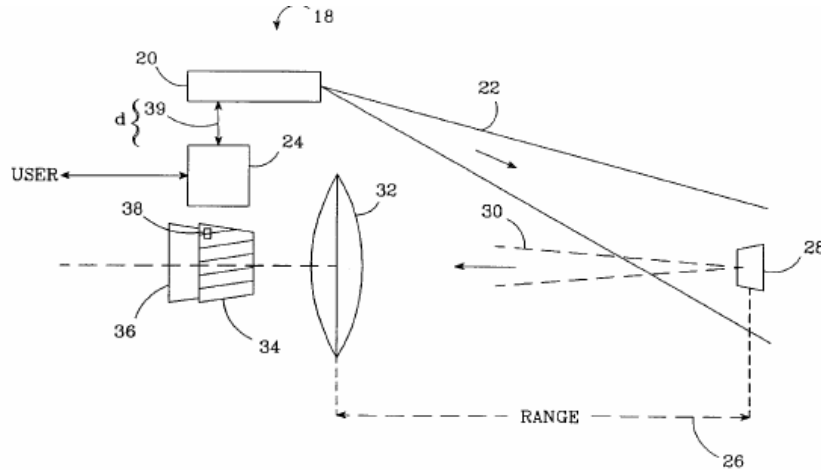**The ALEPH Detector**

R&D ISSCC96 NN/CIS (STM)

- Analog Computation (video encoder H263)

Figure 1: Analog motion estimator.

Rockwell/Conexant 1997-2000

- 1M-pixel, 3T CIS with 8:1 AFE muliplexing in 0.25um with Class-AB read out

- Lidar

C-Cube-LSI 2000-2007
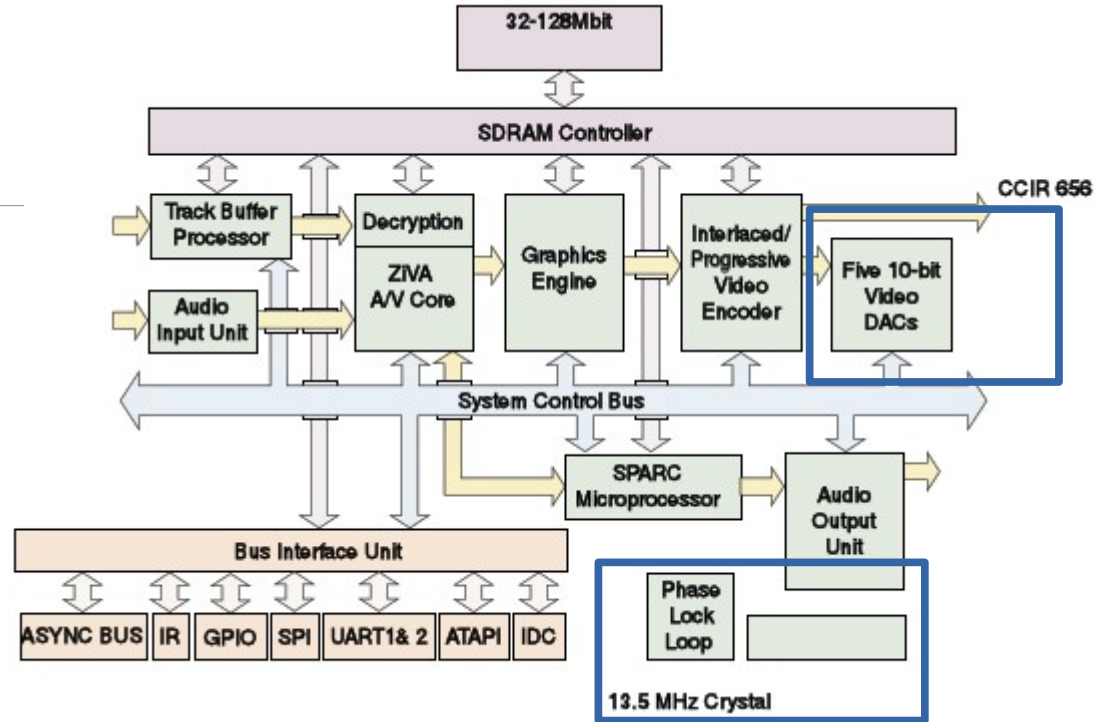
- Ziva5

SAMSUNG

DVD RECEIVER AMP
HT-DM150
HT-DM150J
HT-DM550

Block diagram labels:
- 32-128Mbit
- SDRAM Controller
- Track Buffer Processor
- Decryption
- ZIVA A/V Core
- Graphics Engine
- Interlaced/Progressive Video Encoder
- Five 10-bit Video DACs
- CCIR 656
- Audio Input Unit
- System Control Bus
- SPARC Microprocessor
- Audio Output Unit
- Bus Interface Unit
- ASYNC BUS | IR | GPIO | SPI | UART1& 2 | ATAPI | IDC
- Phase Lock Loop
- 13.5 MHz Crystal

C-Cube-LSI 2000-2007 (cont.)

- DiMeNsion 8652 DVD/RW MPEG1/2

    – Samsung DVD-HR800 and DVD-HR700
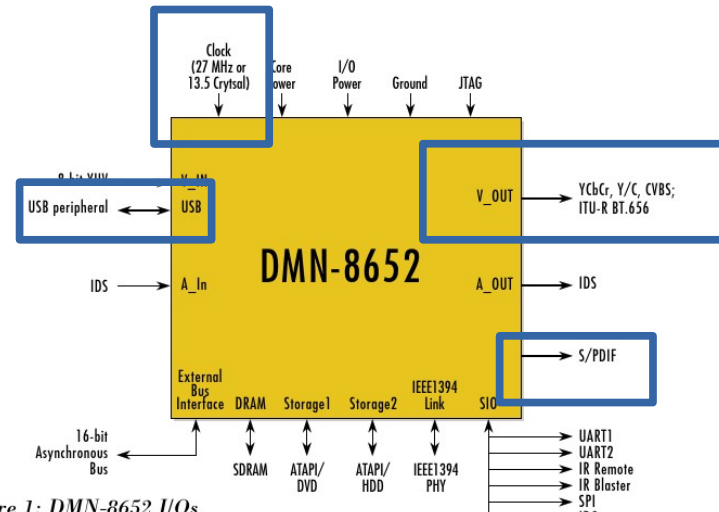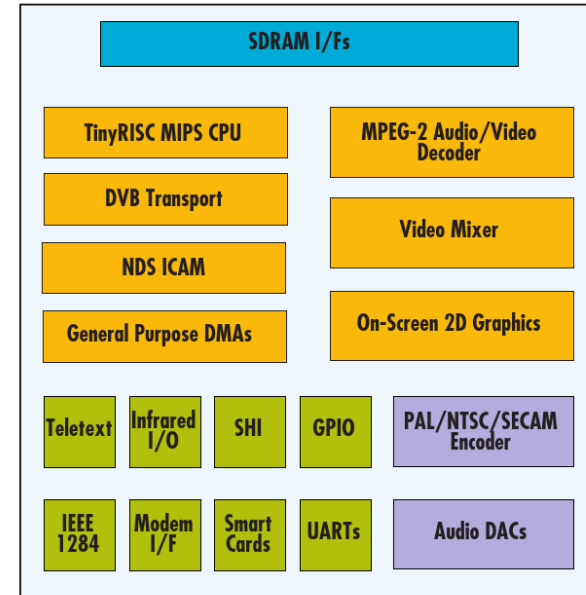
    – JVC DR-MX1

    – Sony

Figure 1: DMN-8652 I/Os

C-Cube-LSI 2000-2007 (cont.)

- ## SC2005 Set Top Box
  - Six Video DAC's (RGB/YPrPb)
  - Audio/Video PLL
  - Crystal Oscillator
  - Special Por for Jtag protection
  - Auxiliary circuits

SC2005 Block Diagram

C-Cube-LSI 2000-2007 (cont.)

- NTSC/PAL decoder
  - 108Msps ADC 4:1 multiplexing
  - System Modeling of the control loop (clamp)
  - Xtal, PLL, Single to Differential converter

2007-2012 Linear Technology

- High speed ADC 14 and 12 bit

    - Ltc-2158-14/12

    - Ltc-2157-14/12

    - Ltc-2156-14/12

    - Ltc-2155-14/12

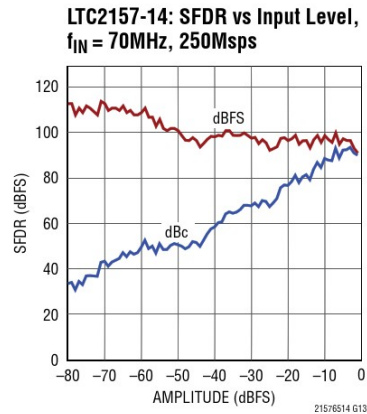   - Ltc-2153-14/12

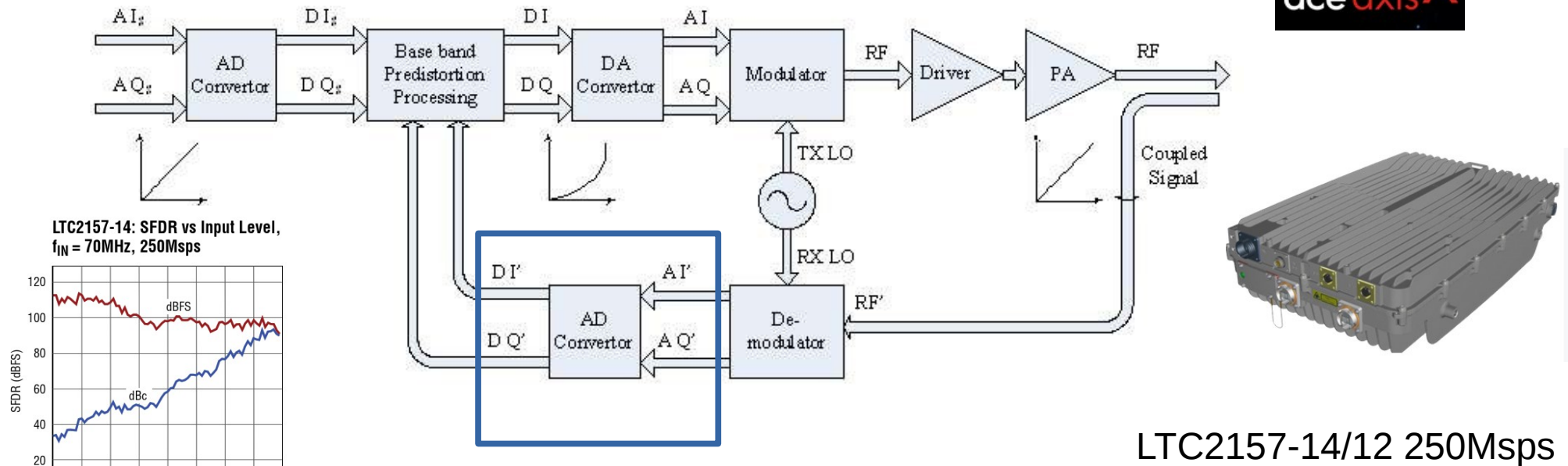   - Ltc-2152-14/12

    - Ltc-2151-14/12

    - Ltc-2150-14/12

LTC2158-14
Dual 14-Bit 310Msps ADC

LTC2153-14
14-Bit 310Msps ADC

2007-2012 Linear Technology (cont.)

- Application : DPD (PA Digital-Pre-Distortion)
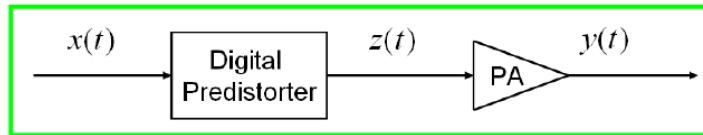

LTC2157-14/12 250Msps

2007-2012 Linear Technology (cont.)
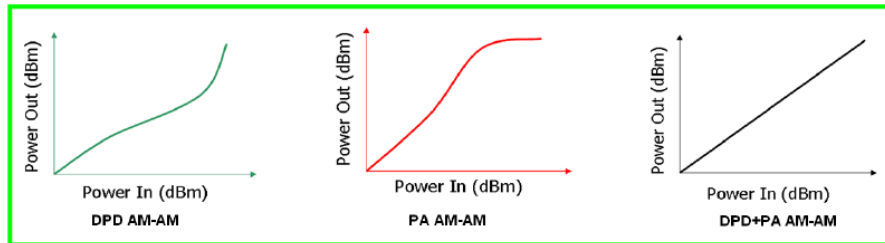
- Application : DPD

Digital Pre-Distortion----- Principle

The DPD-PA cascade attempts to combine two nonlinear systems into one linear result which allows the PA to operate closer to saturation.
The objective of digital predistorter is to have $y(t) \approx Cx(t)$, where C is a constant.

LTM9003 (LTC2157-12 250Msps)

The most important step is to extract PA nonlinear behavior accurately and efficiently.

DPD AM-AM   PA AM-AM   DPD+PA AM-AM

Agilent Technologies

SystemVue DPD
Jinbiao XU
May 26, 2010
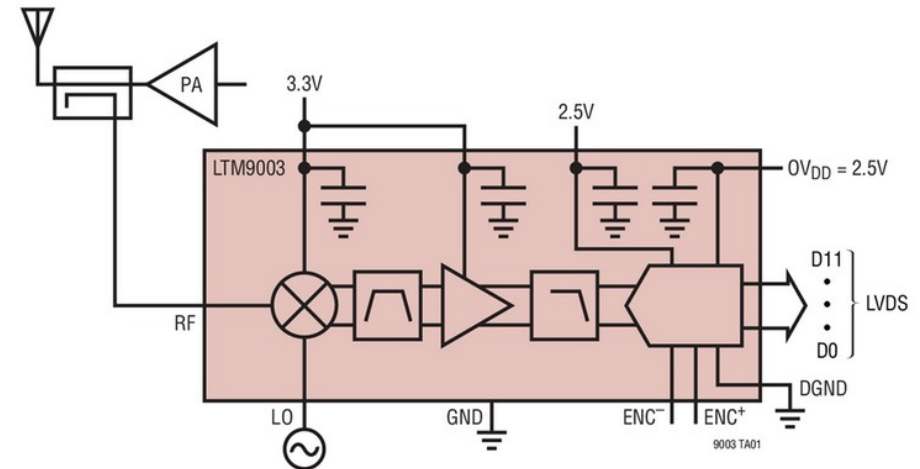
2007-2012 Linear Technology (cont.)

- ADC for direct conversion (Huawei module)
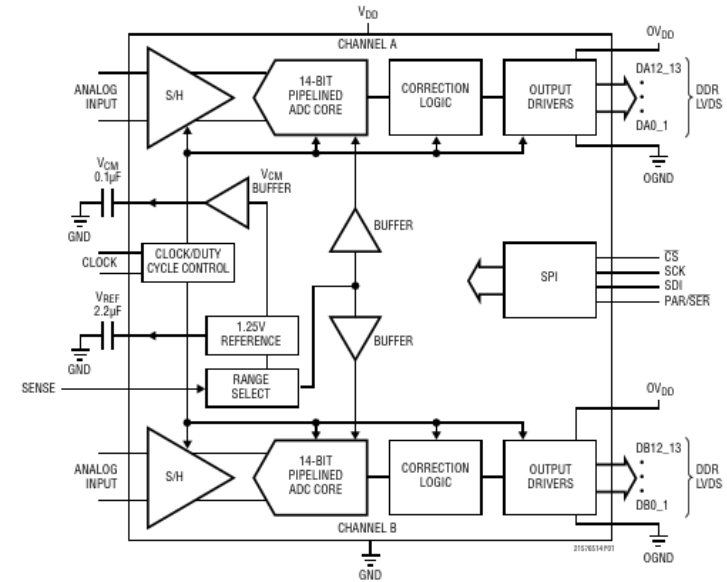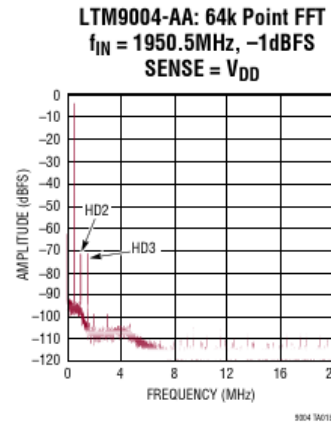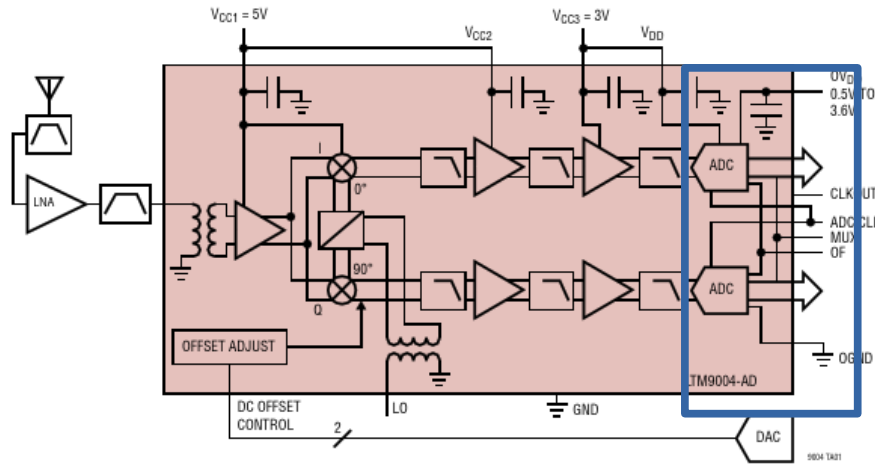
LTC-2157-14 250Msps

2007-2012 Linear Technology (cont.)

- ADC for Data Acquisition (EnTegra)

Ltc-2157-2158-14/12

2012-2014 Analog Devices

- ## Various

- 4X Interleaved 10Gsps (left over from Mobious)

- PID controller for 6MVA IGBT DC-DC (Siemens HVDC)

- GMR sensor for Automotive application (Continental)

- ECG-R with wireless connectivity for (GE Medical)

- Millimeter wave system for Airport Security (Rohde-Schwarz)
  Very interesting subject, how to reduce TB of data from 3008 RF
  Antenna converted into 14 bit to the main CPU system.

2014-2020 Synaptics

- Finger print sensor and NPI (team of 12 people)
  (Samsung Galaxy S6,S7,S8, Huawei,Lenovo,Sharp, Asus etc)

  Manly focus on ATE development in term of FW, Validation, ESD, HTOL.

  - Closely work with operation and design
  - Develop method and Software to systematically:
    - Set ATE limits
    - Detect outlier using custom rejection loops method and MAD technique
    - Define/Design ATE HW (CP, Load Board, related circuit) in collaboration with suppliers MPI, Technoprobe, Form Factor
  - Develop technique custom to post-process & filter ATE data
  - Closely works with Module Test for correlation data and customer interface.

2014-2020 Synaptics (cont.)

- 2015 define and design first single silicon finger print by using an existing IC originally designed for BGA (PCB based sensor).
  - Collaboration: TSMC/Xintec/Speed to develop the Technology
  - Created Cadence PDK, Calibre DRC/LVS and Raphael PDK (Raphael is a 3-D Field Solver from Synopsis)
  - Tape out 12 different sensors with different pixel size and shape
  - Complete characterization/correlation of all of them.

2014-2020 Synaptics (cont.)

- Drive the second generation of integrated finger print sensor
  - Collaboration across several organizations: Package, Module Manufacturing, IHV, Design, ATE, Validation.
  - Unfortunately in 2018 Synaptics shut down finger print

The Future
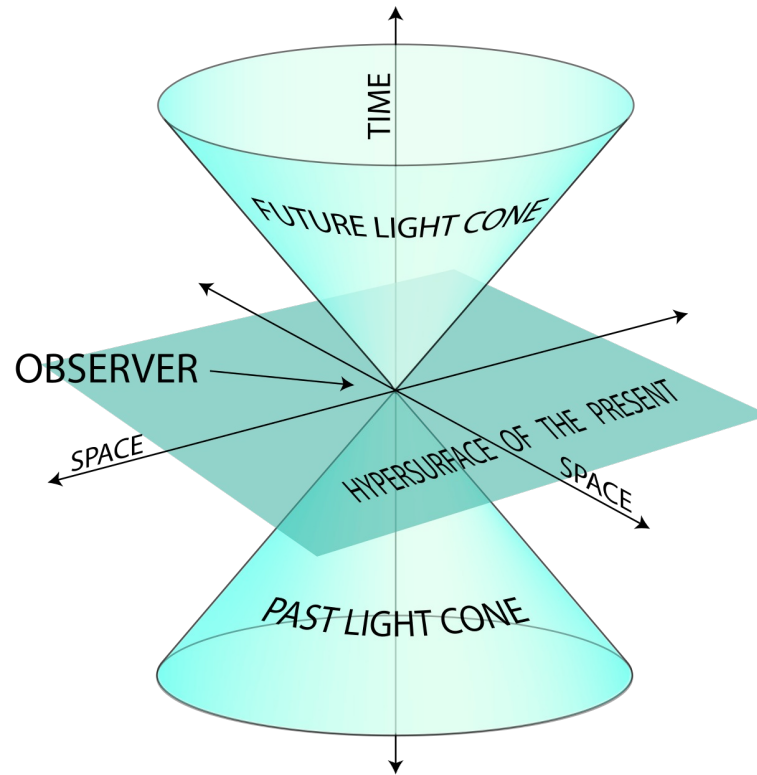
[Hermann Minkowski]

2020

- Founded e-td55
  - Focus on standard/custom product
  - Operating as independent design house
  - Self sponsor
  - Small team of outstanding people
  - Partnership with Asia customer

e-td55 service portfolio

- **Capacitive sensing**
  - Finger print
  - Proximity sensor
- **AFE interface**
  - ADC/DAC
  - PGA
- **RF**
  - Mixer
  - PLL
  - DLL

- **Xray**
  - Companion IC read/drive
- **Automotive**
  - Telemetry Radar AFE
- **Medical/biotech**
  - IC for DNA sequencing 2D matrix
  - ECG/EKG