Logo of your organization

Integrated Electronics for UC-Light

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Research @ LICS-UCR

- RF/Mixed-Signal/Analog IC & SoC
- Design-fo-Reliability for ICs & Systems
- IC CAD & Modeling
- Emerging Micro/Nano Devices & Circuits

Cutting-Edge Facility @ LICS

- EDA: Cadence, Synopsys, ADS, etc; ECAD/TCAD
- Testing: Analog/Mixed-Signal/RF IC testers, ESD tester
- Fabrication: SMIC, GSMC, TSMC, UMC, Chartered Semi, Jazz, IBM, AKM, etc.

RECENT RESEARCH PROJECTS

* Low-parasitic hi-robust ESD protection for RF/AMS ICs
* Super compact ESD protection
* 3D ESD protection simulation-design methodology
* 3D hi-I electro-thermal ESD device modeling
* ESDcat – whole-chip ESD design synthesis & verification CAD
* ESD+RFIC co-design method
* ESD protection for nano technology
* ESD/TVS/EMI/Lightning protection for systems/modules
* ESD-system co-design technique

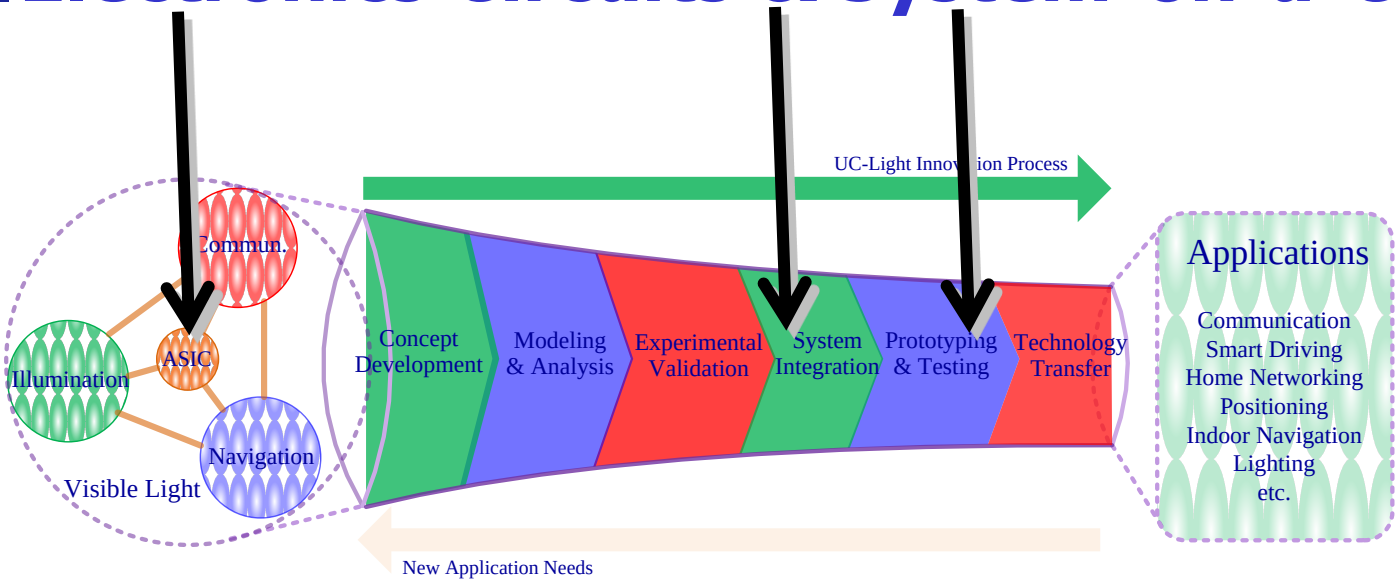
* Multi-mode CMOS RF transceiver ICs
* Gbps full-band carrier-free impulse UWB SoC
* On-Si antenna for UWB
* 24GHz RFID with on-chip antenna
* Transistor-size M-cored inductors for CMOS RF SoC
* Wireless HD RF transceivers
* New PA circuit model
* Modeling & CAD for electro-magnetic devices

* Precision bandgap reference IC in CMOS/BiCMOS
* Resolution/sampling/power-optimized ADC in SiGe BiCMOS
* Low-power multi-Gsps ADC in CMOS

☞Lots of joint designs with companies.
☞Use industrial design flows.
☞Deliver working Si, not just reports.

Tasks for UC-Light

Electronics Circuits & System-on-a-Chip



- ✓Signal processing circuits,
- ✓Communication circuits,
- ✓Design-for-reliability: ESD protection for LED & systems,
- ✓SoC integration

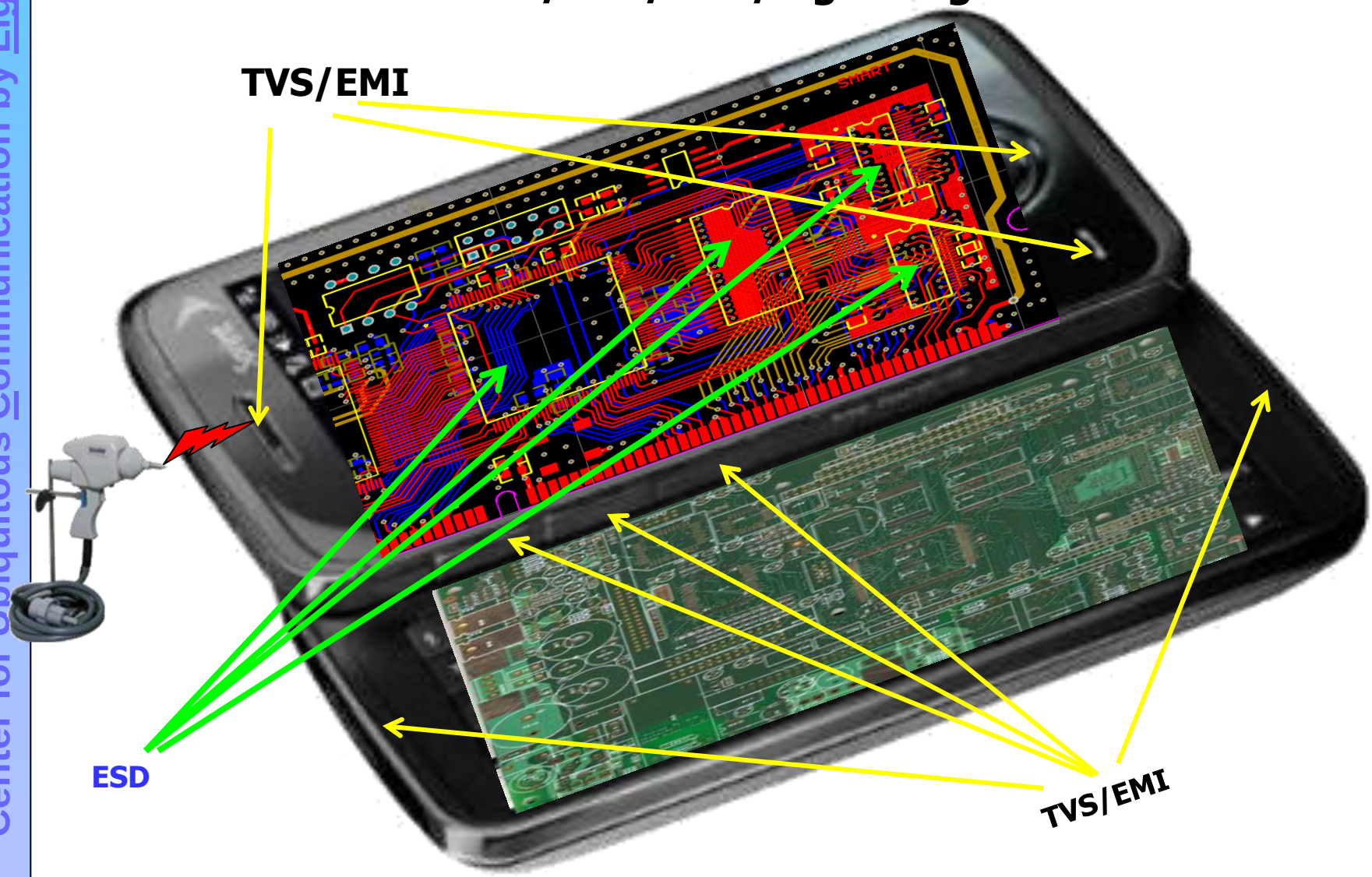
IC Design Projects

- **Signal processing:**
  - ✓ Pre-Amps at O-E conversion
  - ✓ Drivers for E-O interface
  - ✓ ADC ICs
  - ✓ FPGA & ASIC signal processing
- **Communications:**
  - ✓ Wireline transmitters
  - ✓ Wireline receivers
  - ✓ Wireless transcervers
- **ESD protection:**
  - ✓ 4KV ESD protection for all ICs
  - ✓ 4KV ESD protection for LED (integrated ESD?)
  - ✓ 4KV ESD protection and 15A Lightning protection for systems
- **SoC :**
  - ✓ IC integration for most electroncis

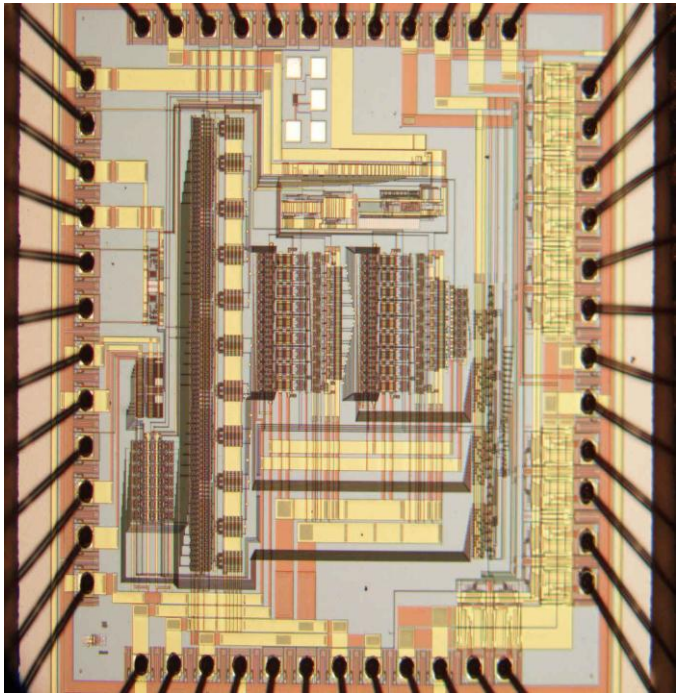
Example: System Level ESD Protection

Full Protection: System + Module + IC

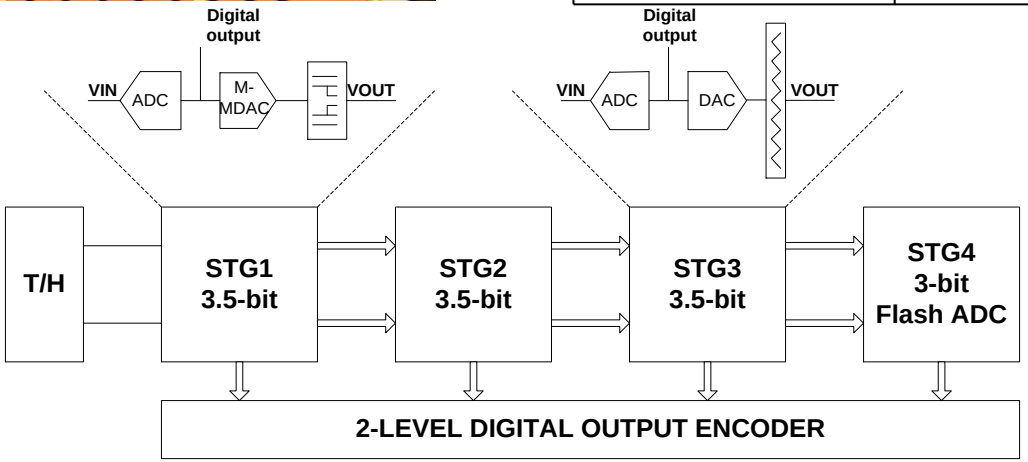
Protection Models: ESD/TVS/EMI/Lightning



Example: 12b/100Msps Pipeline ADC



Specifications	Performance (TYP)
Input Range (diff)	2V
Power Supply	5.0 & 3.0V
Power Dissipation	520mW
Clock Jitter	0.6ps
DNL	< +/-0.6LSB
Gain Error	< +/-2%FS
SFDR	70dB
SNR	62dB
Technology	0.35μm BiCMOS



Example: 0.14pJ/P IR-UWB Transmitter with BPSK Modulation

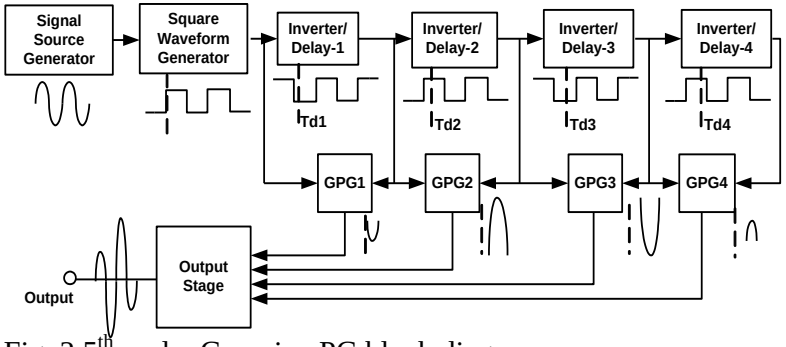
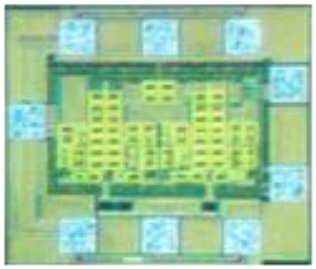
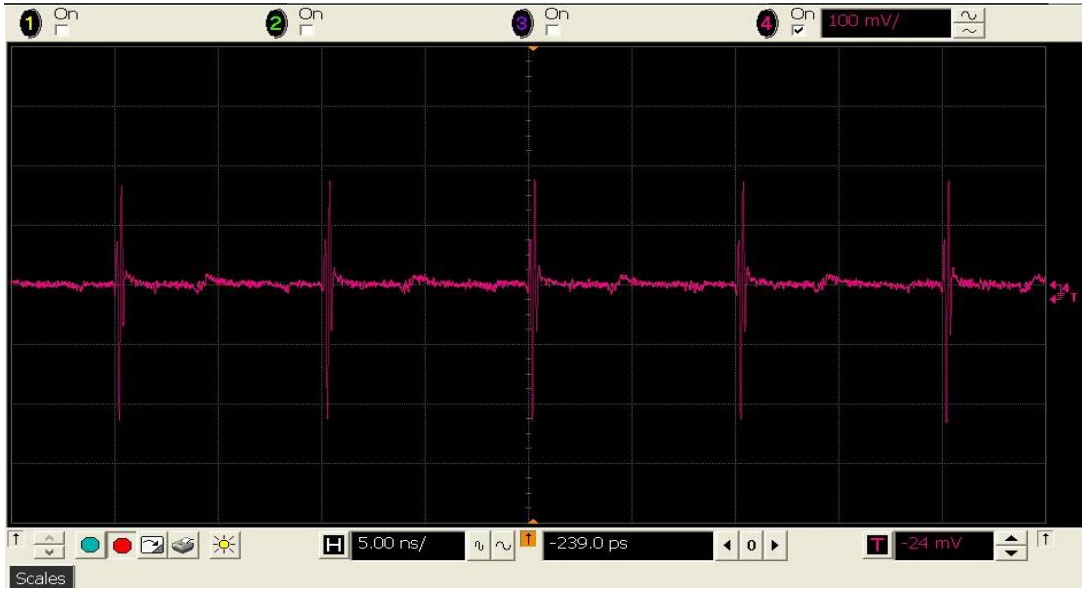
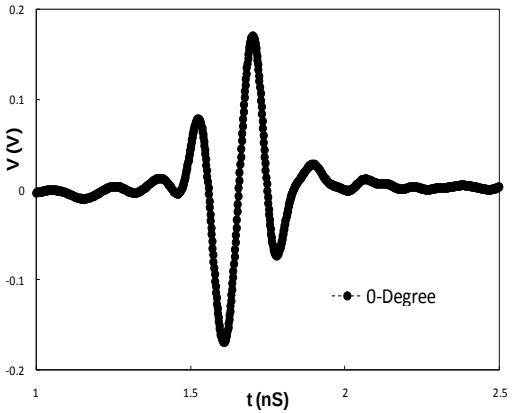


Fig. 2 5th–order Gaussian PG block diagram.







Our electronics will make UC-Light shine and communicate!