Infrastructure

Civil Infrastructure

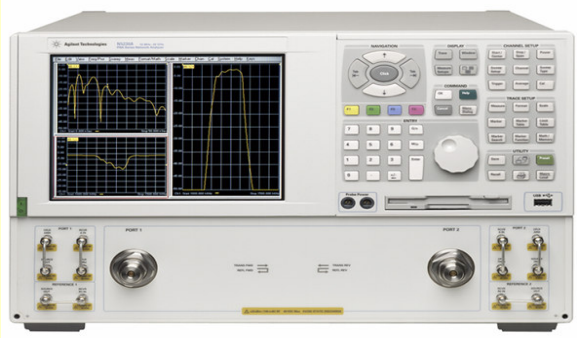
- Built up area - 10,000 Square Feet
- RF Systems Lab
- Signal Processing Lab
- Multilayer PCB Lab
- Conference Hall
- TIFAC CORE Office

Equipment / Facilities

RF Systems Lab

Hardware

- Agilent Vector Network Analyzer (10KHz – 20GHz)



The Agilent PNA-L vector network analyzer is a member of the PNA series network analyzer platform and is designed for general-purpose network analysis needs.
Features:

Balanced measurements,
Frequency offset,
Time domain,
TRL calibration

Utility: Testing and characterization of all RF Components designed up to 20 GHz, RF Propagation Measurements (Motorola)

- Agilent Spectrum Analyzer (9KHz - 26.5GHz)

The ESA-E standard analyzer is an ideal mid-performance spectrum analysis tool for general-purpose RF and microwave measurements.

- 0.4 dB overall amplitude accuracy
- +16 dBm TOI
- -167 dBm DANL, with internal preamp
- 1 Hz narrow resolution bandwidth (optional)
- 1 ms sweep time (50 ns 0 span)
- Variable sweep (trace points) from 2 to 8192

- Agilent Spectrum Analyzer (10KHz-3GHz)

The ESA-E Standard Analyzer is an ideal mid-performance spectrum analyzer for general-purpose RF and microwave measurements.
Features:

- 0.4 dB overall amplitude accuracy
- +16 dBm TOI
- 1 Hz narrow resolution bandwidth (optional)
- 1 ms sweep time (50 ns 0 span)
- Variable sweep (trace points) from 2 to 8192
- Segmented sweep for up to 32 discontinuous spans in one sweep
- Rugged and portable for lab grade performance in the field
- 5 minute warm-up to guaranteed

Utility: Cable Loss Measurements (TVSICS), RF Propagation Measurements (Motorola), Inter modulation Measurements, Educational and Research purposes

- Rhode & Schwarz Signal Generator (20GHz)

The Microwave Signal Generator R&S SMR family offer access to a wide field of applications in production and R&D, where the R& S SMR can be used as a synthesizer or complete signal generator. When equipped with the optional analog frequency and level sweep, the R&S SMR is an ideal tracking generator for scalar network analysis, and the internal IF up converter allows the generation of vector-modulated signals up to 40 GHz.

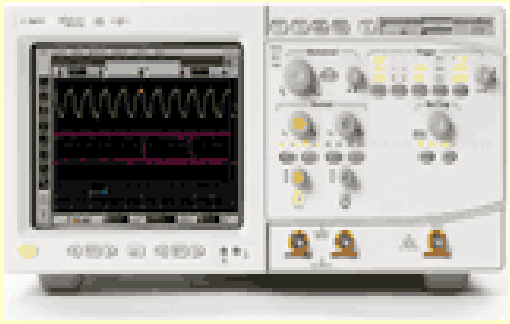
- Agilent Vector Signal Generator & WLAN personality

Agilent's E4438C vector signal generator combines outstanding RF performance and sophisticated baseband generation to deliver calibrated test signals at baseband, IF, and RF frequencies up to 1 GHz
Features

- Frequency range 250 KHz to 1, 2, 3, 4, or 6 GHz
- Output power up to +17 dBm
- RF modulation bandwidth up to 160 MHz
- Flexible FSK, MSK, PSK, QAM, custom I/Q, AM, FM, ØM, and pulse
- Step & list sweep frequency and power
- Internal baseband generator (80 MHz RF BW)

Utility: Cable Loss Measurements (TVSICS), Inter modulation Measurements, Educational and Research purposes

- Agilent 2 Channel Infiniium Oscilloscope (1GHz)

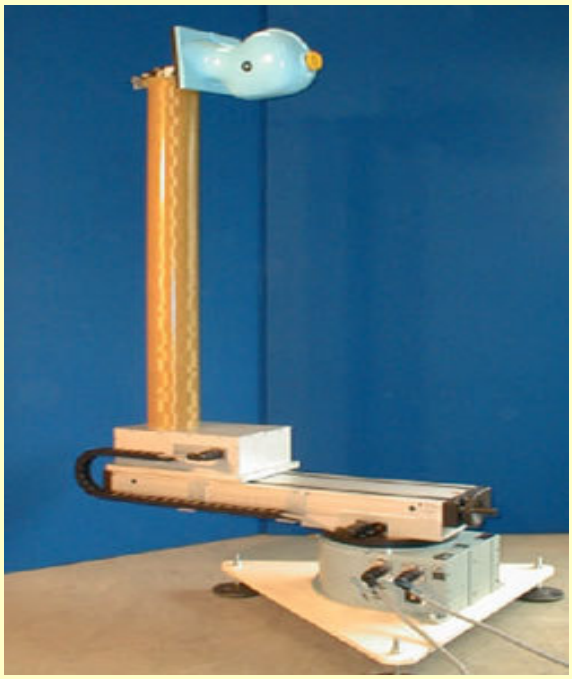


The Agilent Infiniium 54833A is a 1 GHz analysis oscilloscope. It has a 1 GHz bandwidth and a sample rate of up to 4 GSa/s ensuring fast, accurate capture of waveforms.
Features

- 1 GHz bandwidth
- Up to 4 GSa/s sample rate
- Up to 128 Mpts optional memory, also available as after-purchase upgrades
- Standard 1 Mpts memory
- Simple, analog-like front panel with Windows® GUI

Utility: Wireless Board Testing, Educational and Research purposes

- Orbit FR Antenna Measurement System



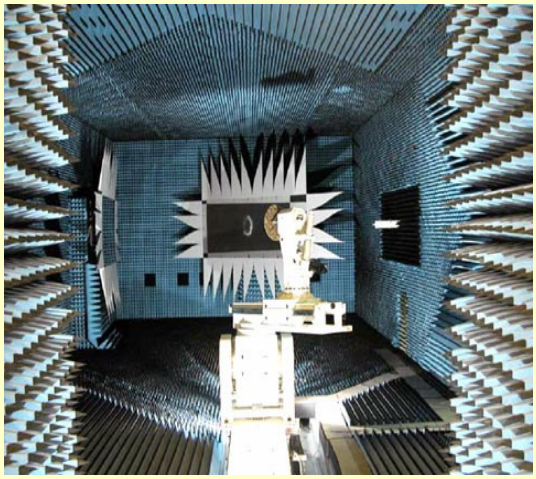
ORBIT/FR offers systems for complete characterization of wireless and mobile devices, allowing for accurate collection of full 3-D pattern measurement data.

The key element in these systems is the AL-DBDR-3G roll over azimuth rotator system. The AL-DBDR-3G is ORBIT/FR's third generation of the Dielectric Belt Driven Rotator, and is a State of the Art positioning product for measuring the radiation patterns of mobile wireless communication devices.

The system includes the AL-DBDR-3G roll-over-azimuth positioning system, digital servo controller, data acquisition workstation configured with either 959Spectrum or MiDAS antenna measurement software and optional transmit polarization positioner system.

- Emerson & Cuming Anechoic Chamber (With CTIA Certification)

The Anechoic Chamber size is 8m X 4m X 4m and operates at a frequency range of 0.8 GHz to 18 GHz. The Chamber comes with an international certification given by Cellular Telecommunications and Internet Association. Products passing CTIA's rigorous analysis are granted the right to display the CTIA Certification Seal. The chamber would be one among the 40 CTIA certified chambers in the world and first of its kind in India.



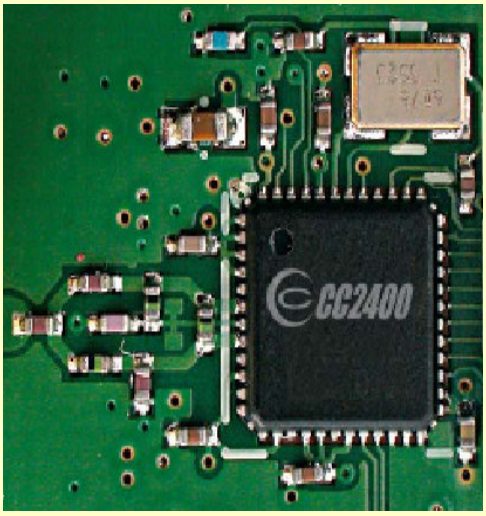
- LPKF PCB Prototype machine

The LPKF ProtoMat® S62 introduces a new era of state-of-the-art circuit board plotters for in-house rapid PCB prototyping. This compact high-speed system provides superior performance for quickly and easily manufacturing circuit board prototypes in a single day.The LPKF ProtoMat S62 delivers unmatched precision with system resolution as fine as 0.25 µm (0.01 mils). As a result, the plotter can mill and drill PCBs with extremely fine traces, including RF and microwave boards.

- MIC Kits & TI RF ID Kit

The Tag it Smart labels are a part of the series 6000 family and are designed for tracking and managing thousands or even millions of items with quick, accurate, and non line of sight identification. The TI – RF ID systems offer two versions of smart labels. The tags operate at the frequency of 13.56 MHz

- Chipcon Wireless Development Boards



Features

- True single-chip 2.4 GHz RF transceiver with baseband modem
- 10 kbps, 250 kbps and 1 Mbps over the-air data rates
- Low current consumption
- Low core supply voltage (1.8 V)
- Programmable output power
- No external RF switch / filter needed
- I/Q low-IF receiver
- I/Q direct up-conversion transmitter
- Packet handling hardware.

Utility: Wireless Sensor Networks, TCE Zignet and Educational Purposes

- Analog Devices DSP Kits

Analog Devices-ADSP 2181, SHARC 21065L, Blackfin
BF533Ez-Kit Lite with Visual DSP++ 2.0 and ADDU-HPPCI-In Circuit Simulator

- Texas Instruments DSP Kits

Texas Instruments-TMS 320C5402, C6711 Starter Kits with Code Composer Studio.

OMAP 1510Deluxe Innovator Development Kit

The OMAP1510 dual-core application processor enables 2.5G and 3G wireless handsets and PDAs to run applications such as streaming video, audio, mobile commerce, location-based services and others. To provide the optimal balance of high performance and low power consumption necessary for these devices, the OMAP1510 combines the TMS320C55x™ DSP core with a TI-enhanced ARM925 processor.

Utility: DSP Implementation of Baseband Signal Processing Algorithms for Wireless Systems

Software

RF Design Software

- Agilent Advanced Design System 2002C

Advanced Design System (ADS) is the RF Designer friendly high-frequency designer and simulator. It has a complete set of simulation technologies ranging from frequency- and time-domain circuit simulation to electromagnetic field simulation that can fully characterize and optimize designs.

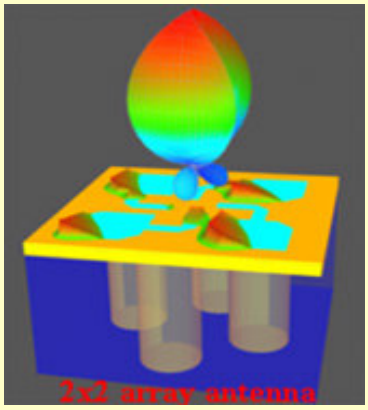
Utility: CPW Discontinuities (RCI), Ka band Mixer (Deal, Dehradun), Transitions, SPST and SPDT Switches, MEMS Phase Shifters (RCI), All RF and Microwave Sub Systems, Educational and Research purposes

- Ansoft HFSS - 3D Structure Simulator

Ansoft HFSS is a high performance full wave electromagnetic (EM) filed simulator for arbitrary 3D volumetric passive device modeling. It integrates simulation, visualization, solid modeling, and automation where solutions to 3D EM problems are quickly and accurately obtained.

Utility: MEMS Filters, Conformal Antennas (CABS), MEMS Switches, Educational and Research purposes

- EMPIRE 3D – Electromagnetic Field Simulator



Empire is a versatile 3D Electromagnetic Field simulator developed by **IMST, Germany**. It is based on FDTD (Finite Difference Time Domain) method, which has become a standard in RF-component design. EMPIRE is a Electro Magnetic field solver for the analysis of Packages Interconnects, Radiators and wave-guide Elements.

MEMS Design Software

- Intellisuite MEMS CAD

The Intellisuite electromagnetic analysis module addresses the needs of researchers in RF MEMS, microwave, and Optical MEMS by providing solutions for high frequency electromagnetic-phenomena.

Utility: MEMS Switches, MEMS Filters, Educational and Research purposes

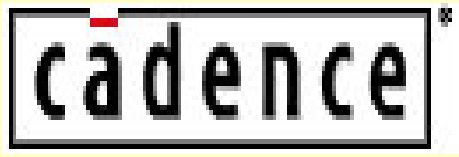
- Coventor MEMS CAD

Coventorware offers design options to explore RF performance of moving parts, high-frequency design, transient effects and the effects of gas. RF MEMS design modules are able to incorporate MEMS devices and systems into any RF application

Utility: MEMS Switches, Cantilever beams, Educational and Research purposes

Analog – Digital Design Software

- Cadence full suite



Analog and Mixed Signal ASIC Design Custom Front-end: Design Entry, Circuit Simulation
Custom back end: Layout Editor

Digital ASIC Design Bundle
Digital Front end: Functional Simulation, RTL Synthesis
Digital Back end: Physical Synthesis and Place & Route

Tools common to Digital and Mixed Signal Designs:
Physical Design for Manufacturing and Interfaces

PCB Design: PCB Design Expert & SI Expert

Capabilities

RF

- CAD of RF Passives and Subsystems and Prototype Development up to Tera Hz region
  - Matching Networks, Filters, Dividers, Couplers,
  - Amplifiers, Switched line phase shifters
- Antenna Design and Prototype Development
  - RFID Antenna
  - Dual band Fractal Antenna
  - Conformal Antenna
- Modeling, Analysis and Optimization of (CAD) of MIC for wireless and other applications
  - ANN Based Filter Synthesis
  - FDTD based Fractal Antenna Analysis
  - Nano Transmission Analysis using Meshless methods
- Design and EM Simulation of RF MEMS Components
  - CPW and ECPW RFMEMS Switches,
  - MEMS Based Switched line and Distributed line Phase Shifters
  - MEMS Based reduced size and tunable Couplers
  - MEMS Based reduced size and Tunable Filters
  - MEMS Based Tunable Amplifiers
- Process Modeling RF MEMS Components

DSP

- Pulse Shape Design for UWB Systems
- Low Complexity Receiver Design for Wireless Systems
- Analog Space Time Coding Techniques for UWB Systems
- Channel Estimation Techniques for Wireless Systems
- Digital Beam forming Techniques for MIMO Systems
- Range and Throughput Enhancement in Wireless Networks
- Chaos based Wireless Communication Systems
- DSP Implementation of Wireless Baseband Systems

Wireless System Development

- Wireless System Behavioral Modeling for 802.x, Wi Max
- Software Development of Wireless Standard Simulation

Testing and Measurement

- RF Component and system Characterization up to 20GHz
- RF Power Measurements up to 26.5GHz
- CTIA Certification for GSM and CDMA
- Prototype PCB up to 20GHz with PTH and 6 layers
- Channel Sounding Facility
- Cable Testing Facility – Fault Detection and Intermodulation Distortion measurement up to 20GHz
- Microwave Non destructive testing