RF/Microwave & Microelectronic Solutions
Amplifiers & Power Amplifiers

RF & Microwave Amplifiers from API have a long heritage in quality and design. From components and modules, to complete amplifier subsystems, API engineers will work with you on your design to develop a custom or semi-custom solution utilizing hybrid thick and thin film and SMT processes with leading edge semiconductor technologies like GaN, MOSFET, LMDOS, GaAs, and SiC.

- **High Power**
  Broadband; Class A, Class AB; Linear; Operating frequencies to 26 GHz
- **Pulsed Power**
Pulsed, solid state power amplifier technology
- **GaN SSPAs**
  1kw output power; ideal for TWT replacement
- **High Frequency**
  4-50 GHz; no NRE charges on most designs
- **High Linearity**
  Performance up to IP2 values of +120 dBm
- **Small Signal**
  Ultra low phase noise, high dynamic range & spurious signal suppression
- **Automatic Gain Control**
  Anticipate power levels and adjust output power
- **Amplifier Drivers & Gain Blocks**
  Offer gain over frequency bands up to 26 GHz
- **Filtered GPS LNA**
  Reduce out-of-band interference; achieve high dynamic range

Filters

Our reputation for designing and delivering today’s most challenging RF & Microwave filters for both defense and commercial applications is unsurpassed. Our engineers specialize in understanding your filter requirements and customizing a solution that delivers superior performance in the smallest footprint.

**Filter Type**
- Bandpass
- Lowpass
- Highpass
- Bandreject
- Space Filters & Multiplexers
- Multi-Function
- Distributed Antenna Systems
- Interference Mitigation Filters

**Topologies**
- Cavity, Ceramic
- Lumped Element
- Tubular, Coaxial
- Suspended Substrates
- SAW & BAW
- Waveguide

Frequency Sources

API Technologies offers an extensive design library of low phase noise sources, optimizing your overall design for superior performance and value.

**Synthesizers**
- **Synthesizers**
  Wide bandwidth; multiple step size; fast switching; low phase noise
- **Affordable Surface Mount Synthesizers**
  Full octave designs; excellent phase noise performance; a programmable EPROM; .800” square package

**Frequency Conversion**
- **Comb Generators**
  Step recovery diode (SRD) generates very narrow voltage spikes
- **Frequency Multipliers**
  Low signal degradation and multiple frequency options

**Oscillators**
- **Dielectric/Coaxial Resonator Oscillators (DRO / CRO)**
  500 MHz to 21.5 GHz; modified standard; units available in HF to Ku band
- **Phase Locked Oscillators (PLO)**
  High reliability; excellent phase noise performance
- **Surface Acoustical Wave (SAW) Oscillators**
  Low phase noise; excellent frequency stability; rugged construction
- **Voltage Controlled Oscillators (VCO)**
  Low phase noise; superior high selectivity
Filters
Oscillators
Frequency Conversion
Synthesizers

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• Surface Acoustical Wave (SAW) Oscillators
• Phase Locked Oscillators (PLO)
• Dielectric/Coaxial Resonator Oscillators (DRO / CRO)
• Frequency Multipliers
• Comb Generators
• Affordable Surface Mount Synthesizers
• Synthesizers

Low phase noise; superior high selectivity

rugged construction

Low phase noise; excellent frequency stability;

High reliability; excellent phase noise performance

units available in HF to Ku band

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a programmable EPROM; .800” square package

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Topologies

• Waveguide
• SAW & BAW
• Suspended Substrates
• Tubular, Coaxial
• Lumped Element
• Cavity, Ceramic

Active Components

API engineers specialize in many types of active RF components
including hybrid mixers, broadband/high isolation switches, RF
limiting amps, digital and voltage variable attenuators, temperature
compensated detectors, PIN diode drivers, A/D and D/A converters,
and operational amps.

• Mixers
  Frequency ranges from 0.5 MHz to 26.5 GHz
• Switches
  Includes PIN diode and GaAs frequencies up to 22 GHz
• Limiters
  Protect from input overdrive and remove amplitude modulation
• Attenuators
  Steps from 0.1 dB to 63.5 dB; frequency from 5 to 200 MHz
• Threshold & Power Detectors
  Converts RF input powers to corresponding DC voltage
• PIN Diode Drivers
  Inverting/non-inverting modes; positive/negative output currents
• A/D & D/A Converters
  High stability and linearity; +5 volts or +15 volts
• Receiver Protection
  S-Band, J-Band, 12-18 GHz; C-, X-, K-Band
• Diodes
  Frequency Multiplier Diodes, Tuning Varactor Diodes,
  PIN Diodes, MNS Chip Capacitors

Rad-Hard Power Conversion & Control

• Positive & Negative Voltage
• Reference/Regulators
• High Power Solid State Relays
• and Solid State latching Relays
• Point of Load Switching Regulators
• DC/DC Conversion
• Data Converters

Passive Components

API has the ability to develop various types of
passive RF components including: delay lines, low
loss and durable rotary joints, electromechanical
phase shifters, high-power handling couplers, and
high isolation power dividers.

• Power Dividers
  High isolation; excellent phase balance &
  amplitude tracking; low loss
• Delay Lines
  BAW, SAW, Lumped Constant, Steel Dispersive
  & Coaxial topologies; wide range of frequency
  and delay
• Rotary Joints
  Durable design for high speed and long life;
  low loss
• Phase Shifters
  DC to 50 GHz; commercial, military, and high
  performance optical applications
• Combiners & Directional Couplers
  Multi-octave broadband; power up to 1500 W;
  flatness as low as +/- 0.4 dB
• WIRELINE® and WIREFAC®, Couplers and Hybrids:
  Frequency independent; quadrature output
  phase; low VSWR; low insertion loss; high
  directivity and freedom from intermodulation

Microelectronics

A world-class leader in the microelectronic vertically integrated solutions industry, API is your one-stop, full-service partner when
superior quality and high performance is a must. Our Microelectronics facilities are proudly certified to MIL-PRF-38534 Class H & K.
Integrated Microwave Assemblies (IMAs)

API’s diverse Integrated Microwave Assemblies are ideal for the advanced solutions needed in today’s defense and commercial wireless systems including oscillator-based, filter-based, and signal conversion applications.

- Switched Filter Banks
- Switched Multiplexers
- Filtered GPS LNAs
- Wireless Filter Assemblies
- Frequency Activity Detectors
- IFMs and DFDs
- Frequency Multipliers
- Synthesizers
- Up/Down Converters
- Receiver Front-Ends
- Box Builds
- Switchable Multi-Channel Amplifiers

Active Antenna Array Solutions

API Technologies designs and develops Active Electronically Scanned Array Solutions including a modular, scalable Active Antenna Array Unit, as well as a variety of drop-in, ready to integrate, high performance T/R modules including Quad and Dual TRMs in X, C and S band configurations. These Active Antenna Array Solutions provide the RF transmit and receive functionality for the front end of transmission systems, and are ideally suited for AESA, E-Scan, naval, airborne, ground-based, vehicle-mounted, air traffic control radar applications, as well as SATCOM on the move, tactical data link applications, and ground, maritime and other missile defense program requirements.

- **Scaleable Active Antenna Array Units**
  API’s Modular Active Antenna Array Unit (AAAU) is comprised of stackable X-Band Quad T/R Module ‘common building block’ units contained within a modular, line-replaceable plank assembly for for scaleability and ease of integration and repair.

- **Transmit Receive Modules**
  API’s Quad Transmit Receive Module, or QTRM, solutions for radar applications offer a unique and innovative solution to system integrators and prime contractors seeking a high performance, high level transmit/receive solution for the development of active antenna array systems and sub-systems. Dual Transmit Receive configurations, as well as integrated T/R assemblies are also available for a variety of phased array applications.

Antennas

From design through manufacturing and testing, API is the leader in complete vertical integration of antennas. Our advanced simulation techniques, in-house prototyping and high volume manufacturing, enable us to deliver custom, or off-the-shelf solutions to meet the unique requirements of commercial, military, and space applications.

- **Patch Antennas**
  1 GHz to 6 GHz; 13mm to 50mm square; Gain response from 0 to 3 dBi for half-power beamwidths of 1100; Gain at boresite (90° elevation) can exceed 6 dBi

- **Planar Antennas**
  Custom linear and circularly polarized arrays; High gain up to 12 dBic in L- and S-Band

- **Custom/Integrated Assemblies**
  150 MHz to 14 GHz; Active antenna assemblies with filter and switching capabilities; GPS, RFID, meter reading, asset tracking, and point-to-point communications

Configurable Product Solutions

*User-Defined Modifications to Existing Standard Designs*

API’s configurable products provide a major advantage through the reduction of up-front engineering and development time, resulting in cost savings, shorter lead times, and faster time to market.

- High Frequency Amplifiers
- Small Signal Amplifiers
- Surface Mount Synthesizers
- Threshold Detectors
- RF Limiters
- Switched Filter Banks
- Filtered GPS LNAs
Featured Markets

Defense/Military
By utilizing advanced technologies and multiple disciplines, API provides rugged, reliable and efficient systems, subsystems, and components for use in the most critical defense and military applications, supporting government programs throughout the world. Our standard, configurable and custom-designed high-rel amplifier, IMAs, frequency sources and RF components are designed to address the most challenging current and emerging defense requirements.

- Electronic Warfare
- Ground and Air Communications
- Broadband Jamming
- Radar
- Missile Defense
- Military Aircraft
- Manpack & Vehicular Radios
- SATCOM
- Wireless Base Stations

Space
API has a rich program heritage of being a leading supplier of some of the most advanced and sophisticated RF, microwave and microelectronic space solutions. Designed to withstand the most extreme of environments and conditions in space, these product solutions include microelectronics and rad-hard power conversion and control components as well as filters, multiplexers, oscillators and amplifiers.

- Deep Space
- Scientific Missions
- Satellite Communications
- Launch & Reentry Vehicles
- Microelectronic Assemblies for Space

Commercial
API Technologies has unparalleled engineering and industry expertise in the commercial aerospace, high temperature electronics for oil & gas, and wireless communications markets. With a rich legacy in the design and manufacture of high performance filter products for the wireless telecom industry, API is a leader in the co-site interference mitigation arena. With a specialization in integrated thick film ceramic hybrid and multi-chip modules, API provides ideal packaging solutions for high performance aerospace electronics.

- Commercial Aerospace & Aircraft
- Air Traffic Control Radar
- Wireless Site Development
- Co-Site Interference Mitigation
- Point-to-Point Communications
- Wireless Connectivity & Capacity Solutions
- Oil & Gas
- High Temperature
- High Reliability Industrial
- Healthcare & Medical Devices
- Test & Instrumentation
- Public Safety
Capabilities & Certifications

With state-of-art facilities in the US and Europe, API helps customers design and manufacture components for the most complex RF, microwave and mmW applications. Our highly trained engineers and expansive vertical integration, combined with state-of-the-art manufacturing facilities and testing, ensure superior performance and projects that are completed on-time and on-budget. API's careful adherence to ISO controlled standard processes guarantees that from conception to design development and into production and final inspection that an API team member is providing the proper oversight and monitoring at each stage in the process.

Manufacturing Capabilities

- Wirebonding
- Fluxless Soldering
- Automated PCB
- Automated Element Attach
- Die Bonding
- Low Temperature Co-fired Ceramic (LTCC)
- Glass Microwave Integrated Circuit (GMIC)
- Ultra High Temp (225°C and above)
- Void-free die attach process
- Braised waveguide splitter/combiner structures
- In-house Laser Sealing for Hermetic and Environmental Integrity
- In-house Thin & Thick Film
- Precision Hybrid & MIC
- Automated SMT & CCA
- In-house SAW Fab
- Precision Machining
- Comprehensive Metal Works

Certifications

- All Manufacturing Facilities Certified to ISO 9001:2008
- Six Certified AS9100 Facilities
- ANSI 20.20 Compliant Facilities
- Department of State ITAR Compliant
- Cleared Facilities & Personnel
- Six Sigma Greenbelts
- Hybrid Lab certified MIL-PRF-38534 (Class H and K)
- QPL MIL-PRF-15733 & MIL-PRF-28861 (Selected Products)
- Solder/Assembly J-STD-001 Class 3 and IPC-A-610
- NEBS Approved (Selected Products)
- RoHS Compliant (Selected Products)