

**INTEGRATED MICROWAVE  
ASSEMBLY & SUBSYSTEM SOLUTIONS**

**apitech**



**RF & microwave signal conditioning and electromagnetic spectrum management solutions, from components to complete subsystems.**



# Integrated Microwave Assembly & Subsystem Solutions

APITech's emphasis on multi-disciplined vertical integration, coupled with its advanced design and engineering capabilities, has enabled us to provide complex assemblies which seamlessly integrate into some of the world's most sophisticated technology platforms.

By providing standard products and common product integration platforms, APITech offers a competitive advantage to systems integrators in the areas of system performance and reductions in overall material costs across the supply chain. Our modular approach mitigates risk in development and allows for parallel processing in manufacture.

With one of the largest collections of component designs in the industry, APITech is able to customize integrated microwave assemblies (IMAs) and subsystems to user specifications using a variety of our own components such as limiters, amplifiers, mixers, filters, and attenuators, which also enables APITech to deliver assemblies that are highly reliable, with strict attention to the conservation of system real estate.

Our designs withstand the most rigorous screening requirements and can be used in commercial and industrial environments as well as demanding military and aerospace applications. Designs are manufactured and tested in the U.S. and U.K.

## Markets & Applications

- Electronic Warfare
- Security & Surveillance
- Radar Systems
- Missile Defense
- C4ISR
- Communications, Navigation, & Identification
- Commercial Aerospace & Aircraft
- Wireless Base Stations
- Test & Instrumentation
- Space
- Command and Control

- Ground and Air Communications
- Jamming
- Signals Intelligence
- Satellite Communications

## Filter-Based IMAs

APITech's expertise in state-of-the-art component design and integration coupled with our strength in filter, amplifiers, and PIN switching, allow us to manufacture IMAs that deliver high performance solutions for OEM's needing feature-rich, custom, and configurable solutions and a high level of integration.

APITech can provide integrated assemblies that not only reduce the overall mechanical footprint, but also offer improved electrical performance achieved through removing mismatch between filter and switch components.

Utilizing design expertise in cavity filter construction, suspended substrate, SAW, and other filter topologies, APITech's engineering team can achieve broader bandwidths, improved out of band rejection, lower insertion loss and other crucial parameters.

## Differentiators

- Low noise, fast switching speeds
- In-house precision machining capabilities
- Excellent rejection properties; low insertion loss
- APITech utilizes proprietary component designs for optimum performance and savings across the supply chain

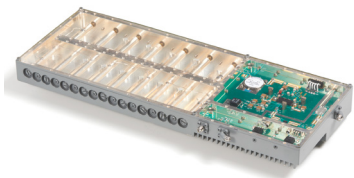
## Core Capabilities

- Switched Filter Banks – Custom and configurable designs; passband frequency 20 – 7,500 MHz; 2 – 7 customizable channels
- Filtered GPS LNAs – Sub 2db noise figure; COTS-based; pre-filtered
- Triplexers & Diplexers – DC to 40 GHz; contiguous and non-contiguous; mixed topologies
- Co-Location Solutions – 2110.6 – w2121.5 MHz, Low PIM, compact size



## APITech's Vertically Integrated Solutions Deliver

1. Greater Performance Efficiencies
2. Savings Across the Supply Chain
3. System Optimization



## Amplifier-Based IMAs

Utilizing advanced semiconductor technologies like gallium nitride (GaN), LDMOS, Silicon MOSFET, GaAs MESFET, and GaAs pHEMT, APITech's engineering team can achieve high power and broad bandwidths in its power amplifier based IMAs and subsystems.

APITech's power amplifier assemblies are able to achieve high power switching and feature digital interface, multiple outputs, and voltage sequencing. An expertise in chip and wire technology and component design allows us to manufacture solutions that are small in size and weight with excellent heat dissipation properties.

APITech understands the demanding and challenging environments our products are required to perform in and can design the appropriate packaging solution to meet the requirements. Our in-house machining capabilities allow for tight tolerances and special configurations, and an expertise in ceramic, metal, plastic and hermetically sealed packaging means APITech can produce customized housings to customer specifications.

### Differentiators

- Various levels of control and interface; multiple outputs
- Ability to achieve frequencies to 26 GHz and output power of 3,200 Watts

- Power Amplifier IMAs utilize advanced semiconductor technologies and operate as continuous wave or pulsed
- Fault detection & isolation; circuit monitoring
- Excellent thermal properties

### Core Capabilities

- Power Amplifiers for TWT Replacement – 1kW output power; efficiencies as high as 20%
- GaN Power Amplifiers – Frequencies up to 18 GHz; high impedance devices suited for wide band operation
- Jamming Amplifiers – 1,930 – 2,000 GHz, 120W output power
- Switchable Multi-Channel Amplifiers – Phase and amplitude matched; built in input over-drive protection; 2 – 8 GHz

## Frequency Generation & Conversion IMAs

Leveraging extensive expertise in component integration and low phase noise sources, APITech offers a full range of custom and standard building block signal generation and conversion solutions in frequency ranges to 50 GHz with exceptionally low phase noise.

Performance is optimized to meet customer needs by using and combining various technologies such as hybrid chip and wire for maximum component density and heat dissipation and surface mount technology for affordability.

### Differentiators

- Frequency ranges to 50 GHz
- Single or multiple outputs at the same or different frequencies
- Internal frequency conversion
- Low phase noise performance; low spurious output
- Internal or external references
- Integrated digital control
- Frequency vs. temperature performance in parts per million





## Core Capabilities

- Master Reference Oscillator Assemblies – 60 – 480 MHz; Output power level +20 dBm
- Multiplied Phase Locked Oscillators – 80 – 1600MHz
- Reference Oscillators – 60 – 480MHz, +20dBm output
- Broadband Synthesizers – 2 – 18GHz frequency range; multiple step size; fast switching speeds
- Frequency Multipliers – Low signal degradation; multiple frequency output options from a single input frequency
- Up/Down Converters – Broadband; low DC power consumption; multiple band input preselectors
- DFDs/IFMs – 2 – 18 GHz; Power < 20W power; high resolution and narrow pulse widths
- Receiver Front Ends – Low noise values; up to 50 GHz

## Subsystem Solutions

### Active Antenna Array Solutions

APITech's Active Electronically Scanned Array Solutions provide the RF transmit and receive functionality for the front end of transmission systems in AESA, E-Scan, naval, airborne, ground-based, and vehicle-mounted radars. Ideal for systems integrators, these solutions support surveillance, SATCOM on the move, tactical data link, and missile defense applications.

### Differentiators

- Field upgradeable, fully interchangeable T/R assemblies support ease of integration and speed of repair
- Simplified installation; no calibration required
- Self-monitoring temperature and cooling options

### Core Capabilities

- Scalable Active Antenna Array Units (AAAU)
  - Modular subsystem composed of stackable QTRMs
  - Line-replaceable QTRM 'plank' assembly facilitates ease of repair and field re-calibration
- Transmit / Receive Modules

- Dual and Quad T/R Configurations
- X, S, and C Band Designs
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### Navigational Systems

APITech manufactures equipment that provides a highly effective means of locating, identifying, and providing navigational assistance for a variety of aircraft outside normal radar coverage and range by means of secondary radar.

APITech's Communications, Navigation and Identification (CNI) solutions are ideal for oil rig, coastal, air-to-air, and marine identification, navigation, surveillance, and beacon systems.

### Core Capabilities

- I-Band Transponder
- RRB Receiver

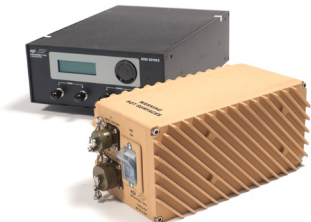


### Power Conversion & Distribution

APITech is a trusted provider of power conversion and power distribution solutions for integration into C4ISR and EW systems. The power conversion product line includes power supplies from 200 to 550 W with 24/28 VDC Output and wide range of VAC Input. Power distribution products are "intelligent" with remote monitoring/ accessibility options in both AC and DC power distribution. Models are ruggedized, temperature stable, and MIL- STD capable.

### Core Capabilities

- Power Conversion
  - Single or 3 Phase AC Power Input
  - Integrated Power Factor Correction and Battery Charger
  - Regulated 28VDC output
  - IP Connectivity at wide temperature ranges
- Power Distribution
  - Out of the box configurations
  - Solid State electronic circuit breaker technology
  - Operating voltages +12, +24/+28, -48VDC
  - Remote channel on/off and reset function; no relays



## Repairs and Retrofitting

Repairing depot level hardware for equipment no longer supported by the original equipment manufacturer is a cost effective solution to the escalating costs of new equipment.

APITech's engineering team can diagnose and repair or upgrade (and in many cases provide a brand new replacement design) a variety of microwave assemblies and hardware, extending the life of many older, otherwise obsolete designs, and extending the life of the program.

## Core Capabilities

- Repair non-APITech-designed subsystems and assemblies
- Meet original manufacturers' specifications
- Maintain "orphaned" mature subassemblies and legacy products
- Upgrade obsolete subassembly performance
- Perform cost effective repairs

## Programmable Attenuator, Switch Units and Subsystems

APITech offers innovative solutions to challenging test, simulation and RF & microwave distribution requirements by providing subsystem products that are standard, off-the-shelf or custom, engineered-to-order designs that integrate a variety of RF & microwave components into a turnkey solution. These subsystems feature typical control interfaces (RS-232, Ethernet, USB, IEEE-488, LabVIEW based GUI, Local Front Panel) in both standard, rack-mount configurations as well as custom, high-density mechanical configurations from DC – 40 GHz.

APITech's programmable subsystems are employed in telecommunications, radar and CNI, satellite and ground communication systems, base station and mobile unit verification

and testing, signal analysis, cable modem and VoIP testing, production test systems and used in conjunction with precision microwave related test instruments.

## Differentiators

- Turnkey subsystems built to customer specified design/layout
- Wide dynamic and frequency ranges
- Low phase noise design and testing
- Front panel and menu controls
- Attenuation/switching schemes
- Customer specified input/output parameters
- Individual to complex matrix/channel configurations
- Specialized testing and calibration
- Optional LabVIEW based Control Software

## Core Capabilities

- Multi-Channel Attenuation Subsystems
- Switch Matrices
- Complex RF Subsystems
- Mobile Unit Fading Simulators
- Programmable Attenuators and Controllers

## SAW (Surface Acoustic Wave) IMAs

Our SAW compressor modules are fabricated on quartz for high temperature stability and feature a digital pulse expander, which enable for increased range of radar without reducing resolution with dispersion times up to 100 us. Ideal for high reliability C4ISR, radar and phased array applications.

## Differentiators

- Assemblies utilize expertise in the design of SAW filters and oscillators
- High temperature stability
- 3-channel and 4-channel options

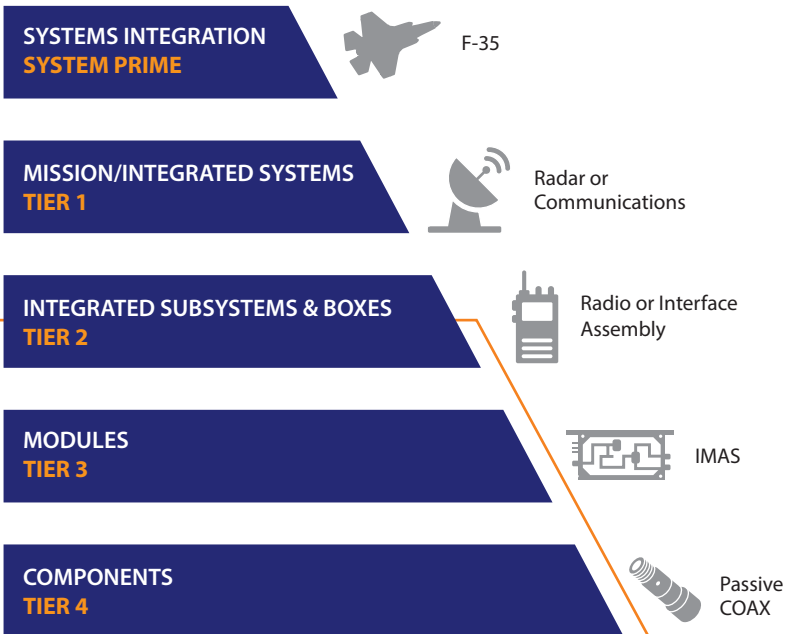




## Who We Are

### Value-added Integration from Components to Subsystem Solutions

APITech provides rugged, reliable, and efficient subsystems, assemblies, and components for use in the most mission critical defense and military applications, supporting government programs throughout the world. With diverse program experience and preferred supplier status with some of the industry's top premier contractors, our precision-engineered MIL-grade products are ideal for applications where uncompromised reliability and uninterrupted performance is required. APITech is the Electromagnetic Spectrum Innovator at Tier 2.5-4 in the supply chain.



## The Electromagnetic Spectrum Innovator

APITech is an innovative designer and manufacturer of high performance systems, subsystems, assemblies and components for technically demanding RF, microwave, millimeterwave, electromagnetic, power, and security applications. A high reliability technology pioneer with over 70 years of heritage, APITech's products are used by global defense, industrial, and commercial customers in applications spanning radar, electronic warfare, unmanned systems, missile defense, harsh environments, space, communications, medical, test and instrumentation, and more.



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