# SWITCHED FILTER BANKS TOUR

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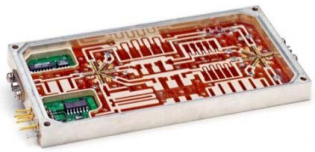
**By combining filter and switch design expertise, APITech can provide integrated switched filter assemblies that not only reduce the overall mechanical footprint, but also offer improved electrical performance.**

# Advanced Technologies

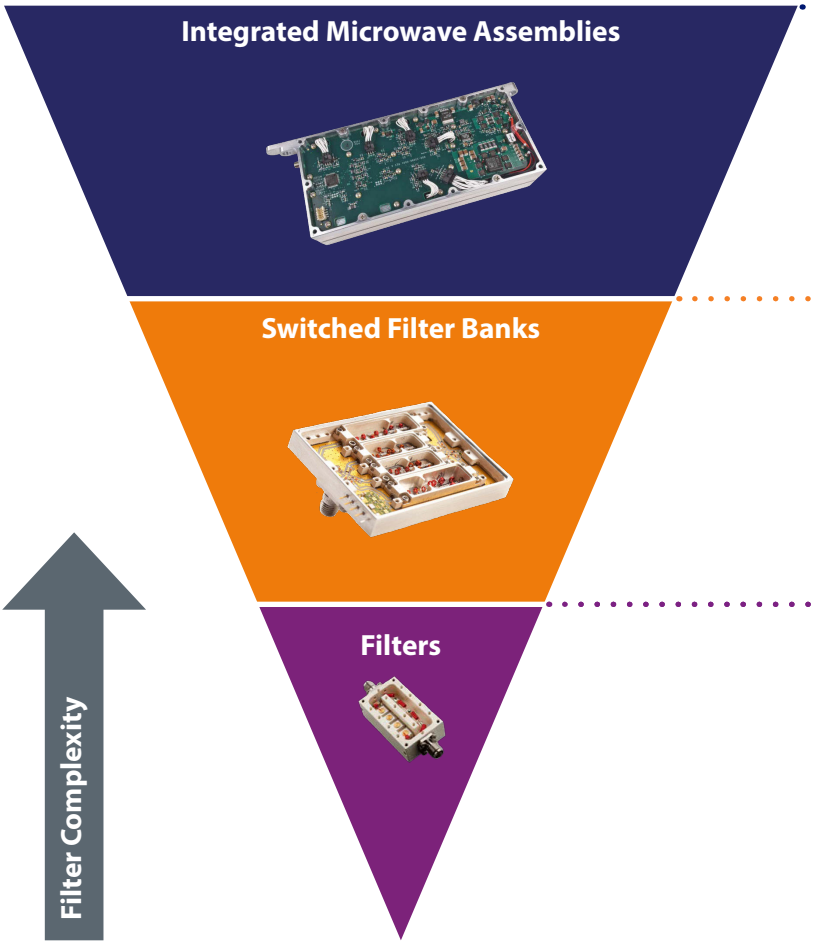
- Filter Technologies: Combline, Interdigital, Lumped, Microstrip, Suspended Substrate Stripline, Dielectric Resonator
- Switch Technologies: Pin Diode, GaAsFET, High Power, High Speed
- Broadband (DC-40) and Standard EW Bands
- Multi-Octave and Sub-Octave Designs Available
- Solid Temperature Stability



# Filter Products

Broad Filter Capability Supporting Optimization of Program Performance, Size, and Cost Requirements

- Lumped Element Filters
- Cavity /Combline/Interdigital Filters
- Tubular Filters
- Waveguide Filters
- Ceramic
- Suspended Substrate Stripline
- Surface Acoustic Wave (SAW)
- Bulk Acoustic Wave (BAW)




## IMAs

- Digital Frequency Discriminators
- Upconverters/Downconverters
- Amplified Preselectors
- Frequency Activity Detectors
- Frequency Multipliers

## Switched Filter Banks

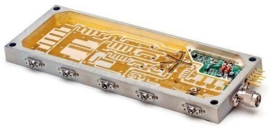
- High Isolation (>80 dB)
- Fast Switching Speeds (<25 ns)
- High Power (100 watts +)
- In-house Filter & Switch Design
- Multiple Control Interfaces (LVTTL, RS-232, USB)

## Filter Optimization

- Cavity
- Lumped Element
- Ceramic
- SAW
- Suspended Substrate

# Value-Added Features

- Leading designer and manufacturer of RF/Microwave filters and switches
- Uniquely able to optimize Switched Filter Bank designs
- Talented staff of filter, switch and thin film design engineers
- Skilled in designing and manufacturing hybrid PIN drivers
- Utilize high performance Schottky diodes to prevent damage in a harsh application environment



# Vertical Integration

More than just single function product designs! We are vertically integrated, drawing from specialists in multiple disciplines such as…

- Thin Film Fabrication
- PIN Diode Switches
- FET Switches
- GaAs Switches
- RF & Microwave Filters
- Switched Filter Banks & Integrated Products
- Driver Circuits – Hybrid & SMT

# The Filter Specialists

Our customers are able to weigh the benefits of:

- Size vs. Loss
- Rejection vs. Size
- Selectivity vs. Group Delay

...and select the perfect filter to optimize system performance and value.

# Expert Craftsmanship

- Hand Wound Torroids
- Precision Substrates
- Skilled Hand Assembly
- Automated Pick-and-Place

# Engineering Capabilities

## State-of-the-Art Engineering

Using state-of-the-art software and simulation tools, our experienced engineering team is able to quickly take a requirement from concept to production.

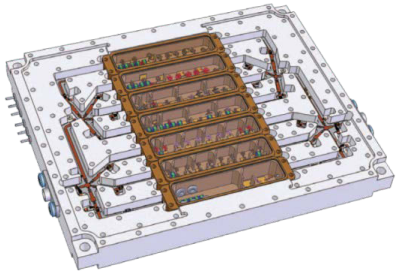
All switched filter bank designs are based on simulations using tools such as

- HFSS
- ADS
- Microwave Office
- Genesys

in order to provide high isolation, compact, low weight units in the shortest possible time.

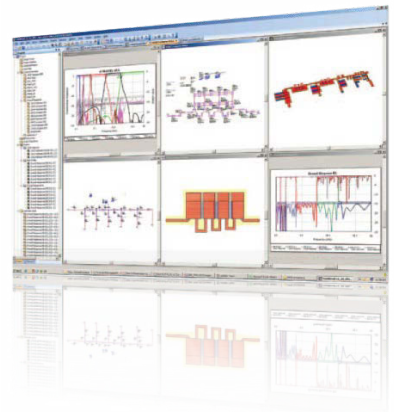
## Partnering with our Customers

Using Genesys and CAD models allows us to integrate the Switched Filter Bank into our customer's system level assembly to ensure proper fit and overall integrity.



### Tools and software our RF Engineers routinely use:

- Ansoft HFSS
- Microwave Office
- Agilent ADS Design Suite
- SolidWorks
- Labview
- Agilent Genesys
- AutoCAD
- Cadence Allegro
- Ansoft Designer
- Sonnet EM Simulator



***3D SolidWorks modeling is used to predict filter profiles as well as to optimize PCB layouts.***

# Performance Enhancements

We offer value added features for our lineup of Switched Filter Banks including:

- Programmable logic for complex switch configurations
- Active gain compensation over temperature
- Channel-to-channel gain leveling
- Multiple control interfaces (LVTTL, RS-232, USB)
- DC-DC converters for high efficiency

# Superior Quality

**Our employees:**

- Are encouraged to suggest product improvements
- Have the skills and tools to identify the slightest imperfections
- Continually strive to exceed the goals placed before them
- Know that our success is directly related to the satisfaction of our customers

✓ **All Manufacturing Facilities Certified to ISO 9001:2008**

✓ **Six Certified AS9100 Facilities (more facilities to be certified soon!)**

**Quality techniques that our design engineers build into every filter:**

- Spring-loaded, self-locking tuning bushings and rotors reducing the risk of metallic slivers which can lead to premature failure in cavity designs.
- Annealing of inductors to remove any metal stress memory for consistent and reliable inductor performance.
- Designs incorporating smooth angles and edges for superior plating adhesion and higher operating power.

### Process Monitoring

We monitor critical phases of the production process with proprietary data logging technology.

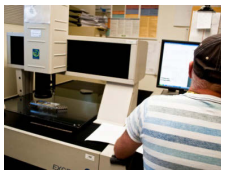
We incorporate strategic disciplined processes including APQP (Advanced Product Quality Planning) to ensure that a specific, structured sequence of operations is completed to prevent potential quality problems.

# Filtering Manufacturing Capabilities

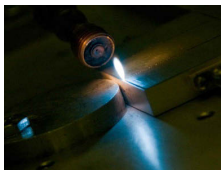
## Prototype/ Production Centers

Prototype Machine

CMM (Coordinate Measurement Machine)

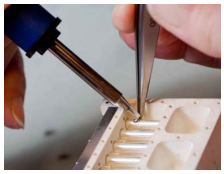


Laser Welding



## Fabrication & Assembly

J-STD-001, Class 3 Soldering



SMT/Pick n Place

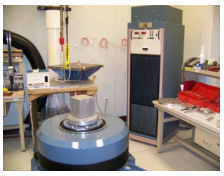
Hybrid Assembly

## Electrical & Environmental Testing

Automated Test & Data Recording

Extensive Burn-in and Thermal Cycling Capabilities

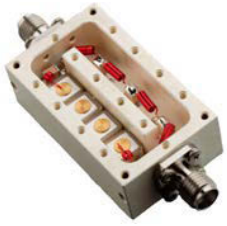
Shock & Vibration Testing



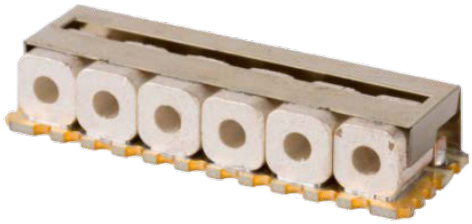
# Extensive List of Features

**Extensive Standard Features and Custom Options:**

- Input Voltage Regulators
- TTL or CMOS Controls
- Input DC and RF Surge Protection
- Optional FET or PIN Diode Switching
- Temperature Compensating Circuitry
- Integrated Couplers to Support Power Management
- Input Signal Injection Port
- Laser Welding
- EMI Pins
- D-Sub and Micro-D Connectors



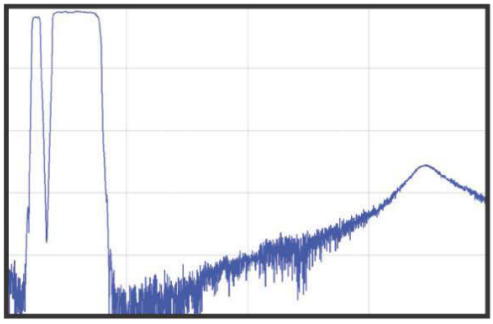
# Multiple Configurations



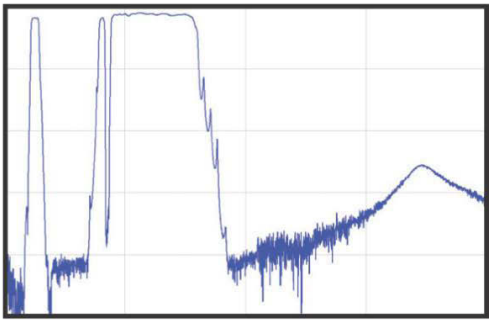
We offer multiple configurations and combinations:

- $2_n$ switched channel combinations ($_n$=number of channels)
- Switching notches
- Any combination of notches and passbands
- Switching contiguous bands

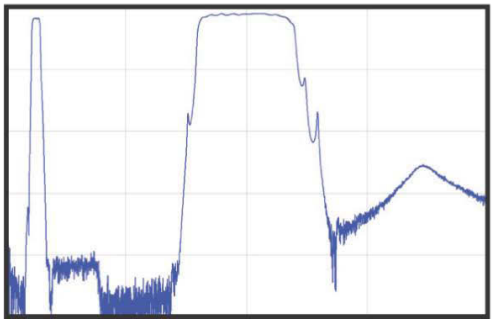
### Channel 1 & 2



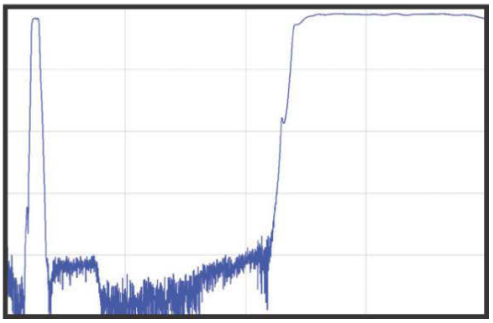
### Channel 1 & 3



### Channel 1 & 4

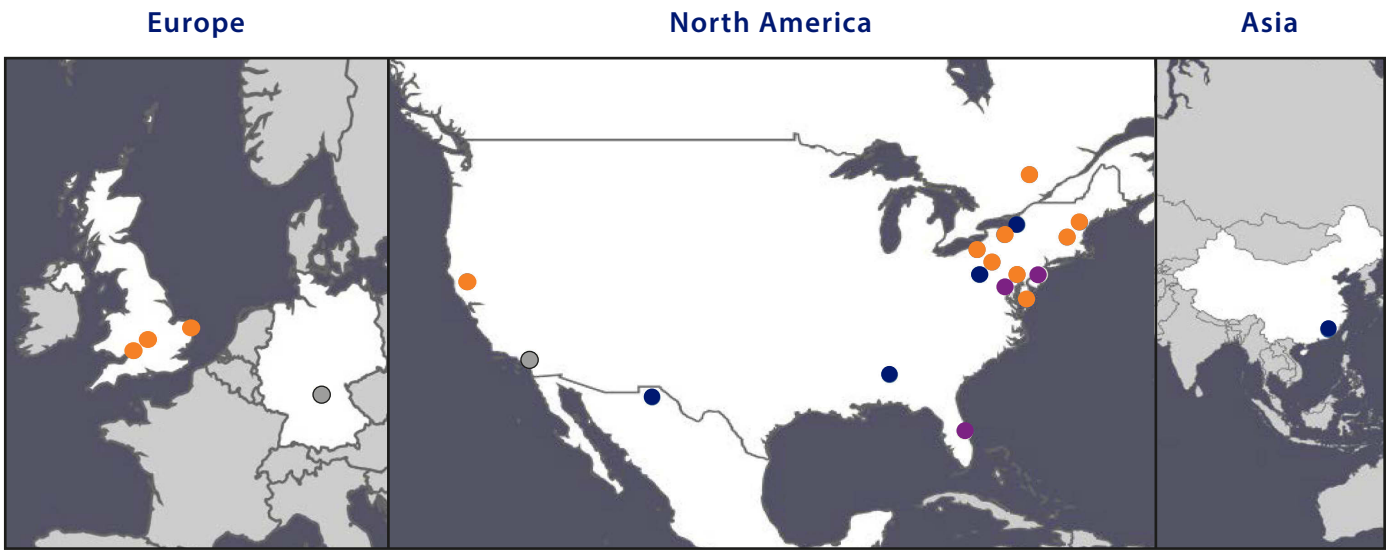


### Channel 1 & 5



# Our Footprint

● Manufacturing Center ● Design &Manufacturing ● Design Center ○ Sales Office




- 12 Trusted facilities worldwide (US, UK, Canada)
- **Technology focused:** Nearly 20% of our employees are engineers and skilled design professionals
- International manufacturing locations are APITech companies - not subcontractors; same equipment and processes as U.S.

# Points of contact

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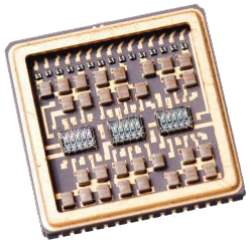
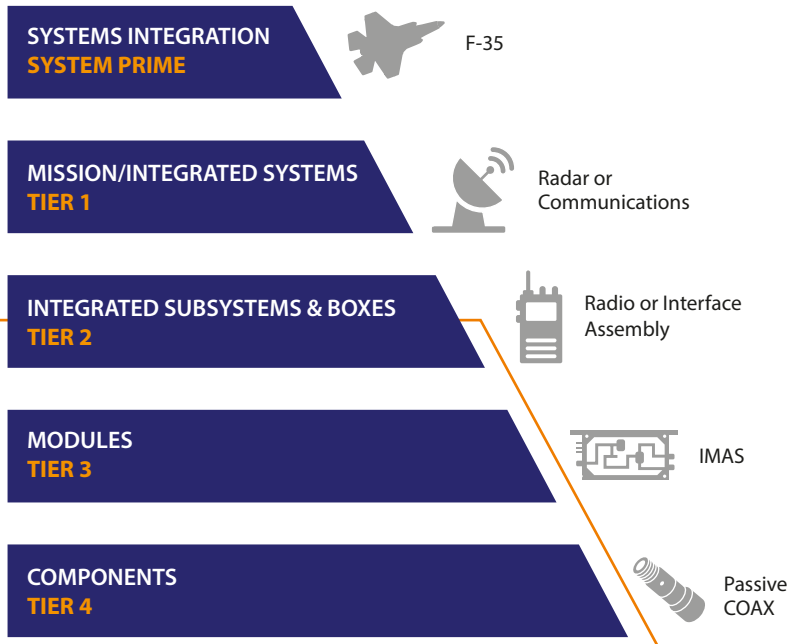


# Who We Are

## 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, millimeter wave, electromagnetic, power, and security applications.

A high-reliability technology pioneer with more than 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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**CONTACT US**