api technologies corp.

Antennas & Antenna Assemblies
COMPANY SNAPSHOT

- Dominant technology provider of RF/microwave, microelectronics, and security products for critical and high-reliability applications
- Deliver high performance, innovative products and services for critical defense, aerospace and commercial applications
- 60% Defense / 40% Commercial
- Publicly traded (NASDAQ: ATNY)
- 2,200+ Employees
- Annual revenues of over $325 million
- Company behind some of the most well-known product brands in the industry
### OUR FOOTPRINT

<table>
<thead>
<tr>
<th>Europe</th>
<th>North America</th>
<th>Asia</th>
</tr>
</thead>
</table>

- **Design & Manufacturing**
- **Design Center**
- **Manufacturing 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 API companies - not subcontractors; same equipment and processes as U.S.**
API Technologies Designs & Manufactures Many Types of Antennas Including:

- Patch
- High-Gain Planar Array
- Passive & Active Assemblies
- Soldier Wearable
- Aperture
- Slots
- Loops/Magnetic Dipole
- Helical Monofilar, Bifilar and Quadrifilar
- Custom Network/Balun
- Spiral
- Cavity Backed
Antenna Applications

- Satcom
  - Iridium
  - Globalstar
  - Inmarsat
- Asset Tracking
- Portable Defibrillators & EMS Notification
- Tank Monitoring
- Fish, Golf Range and Directional Finders
- Highway Safety
- Remote Meter Reading
- Down-Hole Drilling
- Machine to Machine Communication
- Weather Recorders/Balloons
- Short Distance Wireless Data Transfers
- Ocean Buoys
- Surveying Equipment
- Homeland Security
**Antenna Features**

- **Frequency Ranges from 150 MHz to 15 GHz**
- **Small Footprint**
- **Lightweight**
- **Rugged**
- **Low VSWR**
- **High Efficiency**
- **High Gain**

API utilizes multiple standard RF Antenna Design software packages plus proprietary software to expertly design our custom antenna solutions.
API Technologies will Design and Manufacture a Custom Integrated Antenna Assembly for your Unique Application

Pre-filtered GPS LNA with Antenna

- This dual patch antenna assembly provides coverage for GPS L1/L2 and OmniSTAR
- Input is pre-filtered and amplified
- 1.7 dB Noise Figure
- 0.4” tall and weighs only 2.4 oz
- External antenna input and switching
Here are just a few examples of custom integrated antenna assemblies we can develop to meet your unique requirements:

- GPS w/ integrated LNA
- Soldier Wearable Antennas
- Low Observable Antennas
- Arrays
- RFID tag for Down-hole (oil & gas drilling)

Range of frequencies typically covered:

- UHF, L-Band, S-Band, C-Band
- We have done work as low as 130 MHz and as high as 15 GHz

Contact the Factory for More Details!
Optimizing Antenna Design to Match Customer Available Ground Plane and Form Factor

GPS Guided 120 mm Mortar
- 1575.42 MHz (L1)
- 10,000 g
- Operating Temp -32 to 63°C
- Storage Temp -45 to 71°C
- Low Profile
- Other designs rated to 30,000 g
ANTENNAS | L-BAND ARRAY

Features

- Meets Inmarsat Class II Type Requirements
- High Performance in a Compact Design
- Circular Polarization
- 50 Ohm Impedance
- Low VSWR
- Lightweight/Low Profile
- Tx Frequency Band: 1610-1676 MHz
- Rx Frequency Band: 1518-1560 MHz
- Gain: 11 dBi Min.
- Various array sizes available based on gain requirements

Applications

- Satellite networks
- Two-way voice data
- Data communications
- Broadband land portal terminals for military, construction, oil & gas and mining applications
<table>
<thead>
<tr>
<th>Transmit Array</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification</td>
<td>Production Results</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>1620 – 1680</td>
</tr>
<tr>
<td>Nominal Gain, Directivity</td>
<td>14 dB ± 0.5 dB</td>
</tr>
<tr>
<td>Side Lobes H Plane</td>
<td>13.7 dB</td>
</tr>
<tr>
<td>Side Lobes V Plane</td>
<td>14.7 dB</td>
</tr>
<tr>
<td>3 dB Beamwidth H Plane</td>
<td>33.1 degrees</td>
</tr>
<tr>
<td>3 dB Beamwidth V Plane</td>
<td>33.0 degrees</td>
</tr>
<tr>
<td>VSWR</td>
<td>&lt; 1.5:1</td>
</tr>
<tr>
<td>CW Power</td>
<td>20 Watts</td>
</tr>
<tr>
<td>(1600, 1620, 1680, 1700 MHz)</td>
<td>(10 minute dwell time)</td>
</tr>
<tr>
<td>Type Antenna</td>
<td>2 x 2 Linear Patch Array</td>
</tr>
<tr>
<td>Nominal Impedance</td>
<td>50 Ohms</td>
</tr>
<tr>
<td>Polarization</td>
<td>Linear</td>
</tr>
<tr>
<td>Size (L x W x H)</td>
<td>12 x 12 x 1.1 inch</td>
</tr>
<tr>
<td>Connector</td>
<td>SMA Female Rear Mount</td>
</tr>
</tbody>
</table>
## Receive Array

<table>
<thead>
<tr>
<th>Specification</th>
<th>Production Results</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Frequency Range</strong></td>
<td>1470 – 1530</td>
</tr>
<tr>
<td><strong>Nominal Gain, Directivity</strong></td>
<td>13 dB ± 0.5 dB</td>
</tr>
<tr>
<td><strong>Side Lobes H Plane</strong></td>
<td>12.2 dB</td>
</tr>
<tr>
<td><strong>Side Lobes V Plane</strong></td>
<td>12.2 dB</td>
</tr>
<tr>
<td><strong>3 dB Beamwidth H Plane</strong></td>
<td>33.6 degrees</td>
</tr>
<tr>
<td><strong>3 dB Beamwidth V Plane</strong></td>
<td>35.4 degrees</td>
</tr>
<tr>
<td><strong>VSWR</strong></td>
<td>&lt; 1.67:1</td>
</tr>
<tr>
<td><strong>CW Power</strong></td>
<td>2 Watts</td>
</tr>
<tr>
<td><strong>Type Antenna</strong></td>
<td>2 x 2 Linear Patch Array</td>
</tr>
<tr>
<td><strong>Nominal Impedance</strong></td>
<td>50 Ohms</td>
</tr>
<tr>
<td><strong>Polarization</strong></td>
<td>Linear</td>
</tr>
<tr>
<td><strong>Size (L x W x H)</strong></td>
<td>12 x 12 x 1.1 inch</td>
</tr>
<tr>
<td><strong>Connector</strong></td>
<td>SMA Female Rear Mount</td>
</tr>
</tbody>
</table>
Variations of the Standard Ceramic Patch Elements

- The ceramic patch elements can be assembled onto a PWB with either a pigtail of RF cable (length & connector defined by customer) or an RF connector or packaged into a radome assembly with connector or RF pigtail.

- Part number designators begin with:
  
  APxx, Patch element mounted on PWB with RF cable pigtail connector
  
  ACxx, Patch element mounted on PWB with RF connector
  
  ARxx, Patch element mounted in radome, may have pigtail & connector

“xx” denotes the PAxx size element used in the assembly, such as PA25, xx = 25 mm
**AC Series:** Patch Antenna mounted on a ground plane with a connector mounted directly to the PCB. Standard connector is SMA.

**AP Series:** Patch Antenna mounted on a ground plane with a pigtail cable to a connector. Standard designs have 6" (15.2 cm) RG-316 cables, connector varies by application. Alternative lengths and connectors available.

**AR Series:** Patch Antenna mounted on an optimized ground plane with a pigtail cable to a connector, which is tuned and packaged for the plastic radome that covers the complete assembly. Standard cable is RG-316 to MMCX or SMA connectors, others available.
Custom tuning of ceramic patch element

- Many customers require custom tuning to meet their specific frequency requirements or to account for shifts in performance when embedded in their products.
- We can custom tune any PA25, PA28, PA45 or PA78 size antennas.
- Tuning is generally not required for PA45 and PA28 elements due to their large bandwidth. However, custom tuning can be done as needed.
- Consult factory for specific applications & prices for tuning.
### ANTENNAS | OFF-THE-SHELF (PATCH)

**Standard Solutions**

<table>
<thead>
<tr>
<th>Part #</th>
<th>Application</th>
<th>Polarization</th>
<th>Center Frequency (MHz)</th>
<th>2:1 VSWR Bandwidth (MHz)</th>
<th>Gain (dBiC)</th>
<th>Tested Ground Plane (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA251615025SALF</td>
<td>Globalstar</td>
<td>LHCP</td>
<td>1615</td>
<td>25</td>
<td>3.0</td>
<td>60x60</td>
</tr>
<tr>
<td>PA451615-1575SA</td>
<td>Globalstar, GPS (Comm), GLONASS L1 &amp; OmniSTAR</td>
<td>LHCP</td>
<td>1592</td>
<td>135</td>
<td>4.0</td>
<td>63x63</td>
</tr>
<tr>
<td>PA13-1580-005SA</td>
<td>GPS</td>
<td>LHCP</td>
<td>1580</td>
<td>5.0</td>
<td>0.0</td>
<td>30x30</td>
</tr>
<tr>
<td>PA18-1580-010SA</td>
<td>GPS</td>
<td>RHCP</td>
<td>1580</td>
<td>10</td>
<td>1.5</td>
<td>50x50</td>
</tr>
<tr>
<td>PA251575008SALF</td>
<td>GPS</td>
<td>RHCP</td>
<td>1575</td>
<td>20</td>
<td>2.0</td>
<td>35x35</td>
</tr>
<tr>
<td>PA251579008SALF</td>
<td>GPS</td>
<td>RHCP</td>
<td>1579</td>
<td>20</td>
<td>2.0</td>
<td>35x35</td>
</tr>
<tr>
<td>PA25-1227-008SA</td>
<td>GPS (military)</td>
<td>RHCP</td>
<td>1227</td>
<td>20</td>
<td>2.0</td>
<td>60x60</td>
</tr>
<tr>
<td>PA451592175SALF</td>
<td>Inmarsat, GPS (Comm), GLONASS L1 &amp; OmniSTAR</td>
<td>RHCP</td>
<td>1592</td>
<td>175 (3:1)</td>
<td>4.0</td>
<td>63x63</td>
</tr>
<tr>
<td>PA251621025SALF</td>
<td>Iridium</td>
<td>RHCP</td>
<td>1621</td>
<td>25</td>
<td>4.0</td>
<td>60x60</td>
</tr>
<tr>
<td>PA451621-1575SA</td>
<td>Iridium, GPS (Comm), GLONASS L1 &amp; OmniSTAR</td>
<td>RHCP</td>
<td>1592</td>
<td>175 (3:1)</td>
<td>4.0</td>
<td>63x63</td>
</tr>
<tr>
<td>PA282450120SALF</td>
<td>ISM, WiFi (802.11b), WLAN (802.11g) &amp; Bluetooth</td>
<td>RHCP</td>
<td>2450</td>
<td>120</td>
<td>2.0</td>
<td>45x45</td>
</tr>
<tr>
<td>PA37-2450-150SA</td>
<td>RFID &amp; Bluetooth</td>
<td>RHCP</td>
<td>2450</td>
<td>150</td>
<td>3.0</td>
<td>45x45</td>
</tr>
<tr>
<td>PA37-2400-050SA</td>
<td>RFID &amp; Bluetooth</td>
<td>RHCP</td>
<td>2400</td>
<td>50</td>
<td>3.0</td>
<td>45x45</td>
</tr>
<tr>
<td>PA780915030SALF</td>
<td>RFID &amp; ISM (ITU Region 2)</td>
<td>LHCP</td>
<td>915</td>
<td>30</td>
<td>3.0</td>
<td>101.6x101.6</td>
</tr>
<tr>
<td>PA780868030SALF</td>
<td>RFID &amp; ISM (ITU Region 1)</td>
<td>LHCP</td>
<td>868</td>
<td>30</td>
<td>3.0</td>
<td>101.6x101.6</td>
</tr>
</tbody>
</table>
API TECHNOLOGIES’ FEATURED CERTIFICATIONS

- All Manufacturing Facilities Certified to ISO 9001:2008
- 6 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)
- TEMPEST Certifications including: CID/09/15(A), NSTISSAM TEMPEST/I-92, SDIP 27.
Dennis Barrick
Technical Marketing Director
Dennis.Barrick@apitech.com