## Features at a Glance

### WIDE RANGE OF INTERFACES

Integrated Cortex M4F Microcontroller exposes SPI, QSPI, USART, ADC, I2C, GPIO, and JTAG.

### CAT M1 / NB-IOT / BLUETOOTH 5 - ALL WITH CO-LOCATED RADIO CERTIFICATION

Simplified certification process with reduced costs - multi-wireless integration at its very best for your risk reduction

### DEPLOY WITH CONFIDENCE

Wireless security, smart power management, and popular cloud service integration helps your device continue gathering data autonomously.

### ZEPHYR RTOS

The Zephyr tools suite simplifies complicated configurations, and our DVK environmental sensor and sample test apps get you up and running quickly.

### CERTIFIED FOR DEPLOYMENT AROUND THE WORLD

Regulatory approvals for FCC (USA), IC (Canada), ETSI (Europe). Carrier certified for Vodafone, T-Mobile US, AT&T, and Verizon. [all pending].

### PERSONAL SUPPORT FOR YOUR IMPLEMENTATION

Free antenna scans, design reviews, on-site EMC support and a global team of FAEs and Tier 2 support help accelerate your product to market.


# Pinnacle™ 100 Modem

LTE CAT M1 & NB-IoT Modem with integrated Bluetooth v5 Cellular End Device certified

- Integrated or external antennas
- Hostless operation – Full flexibility of Zephyr RTOS
- Low power operation – eDRX and PSM
- Powerful MCU on board with integrated Bluetooth v5 including LE long range and Mesh
- Complete radio and cellular certifications
- Wide input voltage range

**The Pinnacle™ modem seamlessly incorporates a powerful Cortex M4F controller, full Bluetooth v5 and LTE CAT M1/NB-IoT capabilities – all with full regulatory certifications and LTE carrier approvals.**

Develop your application directly on the M4F controller using Zephyr RTOS to cut BOM costs and power consumption. Take advantage of the Zephyr community, Laird's sample code (cellular, Bluetooth) and hardware interfaces, OR use our hosted mode AT commands set.

This innovative modem family also offers complete antenna flexibility – on-device, off-board, as well as external antennas – to give you design flexibility, reduce complexity, and simplify your overall product solution.

Extremely power conscious, the Pinnacle 100 is ideal for battery-powered devices operating at the edge of your IoT networks, seamlessly bridging the cellular WAN to the Bluetooth PAN. It's never been easier to bridge wireless Bluetooth 5 sensor data to cloud services like AWS IoT over a low-power LTE connection.

- **LTE CAT M1 / NB-IoT radio via Sierra HL7800**
  - **(Altair ALT1250)** – LTE bands 1, 2, 3, 4, 5, 8, 12, 13, 20, 28
  - **Nordic nRF52840** – BT v5, Coded PHY (Long range), 2MPHY
- **Onboard Cortex-M4F Microcontroller** – 32-bit @64 MHz, 256 KB of RAM, 1 MB internal flash, 8MB QSPI
- **Industrial Temp Range** – Operating range -40° to +85° C
- **Globally & Carrier Certified** – FCC, IC CE, BT SIG plus PTCRB, GCF and **End Device** certified – AT&T, Verizon, Vodafone (all pending)
- **Flexible Programming** – Design your way: Hostless mode via Zephyr RTOS or Hosted mode AT Command Set
- **Secure Firmware Upgrade** – Comes pre-programmed with Laird's secure bootloader
- **Antenna Options** – Unique integrated antenna variant plus external variant with U.FL connectors

CAT-M1 · NB-IoT · LTE · Bluetooth 5 · NORDIC SEMICONDUCTOR · altair semiconductor

Security and Building Automation

Wireless Sensor Connectivity

Internet of Things Connectivity

Connected Home

| CATEGORY | FEATURE | SPECIFICATION |
|---|---|---|
| Chipsets | LTE CAT M1 / NB-IoT | Sierra HL7800 (Altair Semiconductor ALT1250) |
| | Bluetooth 5 / MCU | Nordic Semiconductor nRF52840 (Cortex-M4F, 32 bit @ 64 MHz) |
| Microcontroller | Memory | 256 KB RAM<br>1 MB Internal Flash |
| | Interfaces | UART |
| | Additional Features | QSPI, SPI, ADC, I2C, GPIO, Timers |
| | Debugging | JTAG, UART |
| Cellular | LTE Category | LTE CAT M1 / NB-IoT, Release 13 GPP |
| | Typical transmit power | Up to 23 dBm |
| | Typical receive sensitivity (CAT-M) | TBC |
| | Typical receive sensitivity (NB-IoT) | TBC |
| | Frequency Bands | 1, 2, 3, 4, 5, 8, 12, 13, 20, 28 |
| Bluetooth | Standards | Bluetooth v5 |
| | Additional Features | Coded PHY (Long Range), 2MPHY, BLE Mesh |
| | Class | Class 1 up to +6 dBm max |
| SIM | Type | 4FF Nano SIM card slot<br>Integrated ESIM (future capability) |
| FW Upgrade | Interface | UART/JTAG |
| | OTA | Bluetooth and cellular |
| Power Consumption | Power Save Mode (PSM) | TBC mA |
| | eDRX | TBC mA |
| | BLE – TX | TBC mA |
| | System Deep Sleep | TBC mA |
| Form Factor | M2 Connector | Double-sided board with M2 style connector interface |
| Electrical | Operating Voltage | 2.2V to 5.5V |
| Physical | Dimensions | External antenna module: 30.5 x 32 x 4.6 mm<br>Integrated antenna module: 49.2 x 49 x 12.9 mm |
| | Operating Temperature | -40° to +85° C |
| | Storage Temperature | -40° to +125° C |
| Software | Hostless | Zephyr RTOS |
| | Hosted | AT Command Set |
| Approvals | Regulatory (pending) | FCC, IC, ETSI,<br>PTCRB / GCF<br>Bluetooth SIG |
| | Carrier (pending) | Verizon, AT&T (CAT M) – Vodafone (NB-IoT) |
| | Environmental | REACH and RoHS compliant |

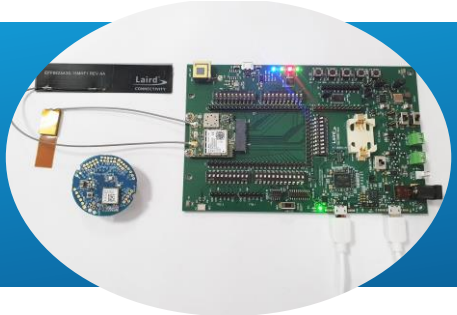
*For full specifications on the Pinnacle 100 modules, please see the appropriate datasheet.*

## Ordering Information

| PART | DESCRIPTION |
|---|---|
| 453-00010 | Pinnacle 100 modem, integrated antenna |
| 453-00011 | Pinnacle 100 modem, external antenna |
| 453-00010-K1 | DVK, Pinnacle 100 modem, integrated antenna |
| 453-00011-K1 | DVK, Pinnacle 100 modem, external antenna |

## Laird Connectivity Certified Antennas

| PART NUMBER | TYPE | FREQUENCY | CONNECTOR |
|---|---|---|---|
| EFF6925A3S-15MHF1 | Flex PCB | 698–875, 1710–1250 MHz | U.FL |
| DBA6927C1-FSMAM or FSMAF | Dipole | 698–2690 MHz | SMA |
| 001-0014 | Flex PIFA | 2.4–2.5 GHz | U.FL |
| NanoBlue-MAF94045 | PCB Dipole | 2.4–2.5 GHz | U.FL |
| 001-0001 | Dipole | 2.4–2.5 GHz | RPSMA |



## Pinnacle 100 – Development Kit

With Pinnacle LTE modem, dev board, external BLE environmental sensor board, cables, batteries, antennas, plus SIM card and data, and a complete cloud demo environment build on AWS – start now!

Interested in Laird's Pinnacle 100? **Visit us at lairdconnect.com/pinnacle-100-modem**

Laird CONNECTIVITY