# ❙ Functional Description

- support various location and navigation applications
    - It is the industry's highest level of sensitivity (-165dBm)
    - instant Time-to-First Fix (TTFF)
    - Precise GNSS signal processing give the ultra-precise positioning under low receptive
    - high velocity conditions

# ❙ Power consumption

Power management design makes CD-PA1010D easily integrated into your system without extra voltage regulator. The PA1010D support operational modes that allow them to **provide positioning information at reduced overall current consumption.**
Availability of GNSS signals in the operating environment will also be a factor in choice of power management modes. The designer can choose a mode that provides the best trade-off of performance versus power consumption.

The power management modes are described below, and can be enabled via command:

- Full Power Continuous - for best GNSS performance
- Power saving mode to optimize power consumption:
    - Standby mode
    - Periodic mode
    - AlwaysLocate™ mode (*Intelligent Algorithm (Advance Power Periodic Mode) for power saving*)
- Backup mode

**The excellent low power consumption of CD-PA1010D** make it easier to applied to power sensitive devices, especially portable applications, need not worry about operating time anymore and user can get more fun.

**GPS Consumption** current(@3.3V):

- Acquisition: 36mA Typical
- Tracking: 28mA Typical

# ❙ EASY™

The EASY™ is embedded assist system for quick positioning, **the GPS engine will calculate and predict automatically the single ephemeris (Max. up to 3 days)when power on, and save the predict information into the memory,** GPS engine will use these information for positioning if no enough information from satellites, so the function will be helpful for positioning and TTFF improvement under indoor or urban condition, **the Backup power (VBACKUP) is necessary.**

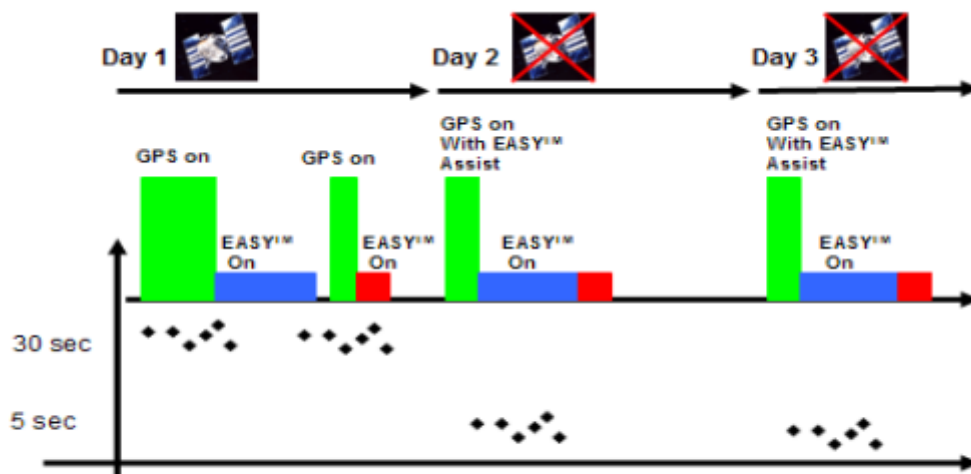Up to 3 days extension for single received ephemeris:

Figure 1-2 EASY System operation

When GPS device great the satellite information from GPS satellites, the GPS chip automatically pre-calculate the predict orbit information for 3 days. The GPS device still can quickly do the positioning with EASY™ function under weak GPS signal.

## Power Management Mode

The PA1010D support operational modes that allow them to **provide positioning information at reduced overall current consumption.** *Availability of GNSS signals in the operating environment will also be a factor in choice of power management modes. The designer can choose a mode that provides the best trade-off of performance versus power consumption.*

## Full Power Continuous Mode

*The modules start up in full power continuous mode.* This mode uses the acquisition engine at full performance resulting in the shortest possible TTFF and the highest sensitivity. It searches for all possible satellites. **The receiver then switches to the tracking engine to lower the power consumption when:**

- **A valid GPS/GNSS position is obtained**
- **The ephemeris for each satellite in view is valid**

To return to Full Power mode (from a low power mode), send the following command: `$PMTK225,0*2B` (the module will wakes up from its previous sleep cycle).

## Power Saving Mode

## Standby Mode

In this mode, **the receiver stops navigation**, the internal processor enters standby state, and *the current drain at main supply (Vcc) is reduced*. Standby mode is entered by sending the following command: `$PMTK161,0*28`

The host can then wake up the module from Standby mode to Full Power mode by sending any byte to the serial port.

## Periodic Mode

This mode allows **autonomous power on/off with reduced fix rate to reduce average power consumption**. In periodic mode, **the main power supply Vcc is still powered, but power distribution to internal circuits is controlled by the receiver.**
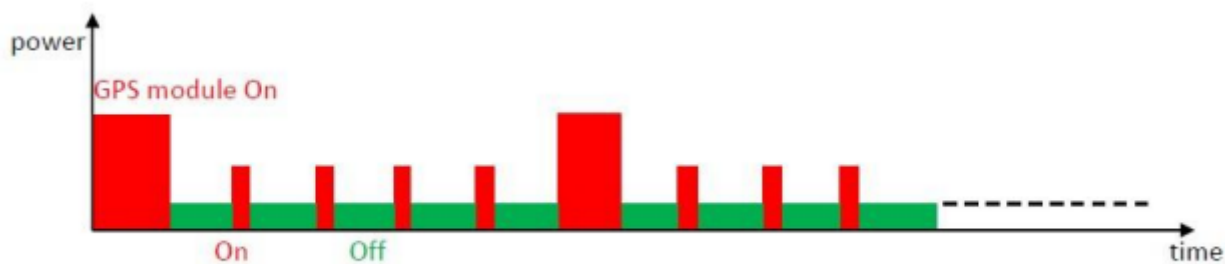
*Figure 1-3 Periodic Mode operation*

Enter periodic mode by sending the following command: `$PMTK225,Type, Run_time, Sleep_time,2nd _Run_time,2nd _Sleep_time*checksum`
Where:

- Type = 1: Periodic backup mode, Type = 2 : Periodic standby mode
- Run time: Full Power period (ms)
- Sleep time: Standby period (ms)
  - 2nd Run time: Full Power period (ms) for extended acquisition if GNSS acquisition fails during Run time
- 2 nd Sleep time: Standby period (ms) for extended sleep if GNSS acquisition fails during Run time.

ℹ️ (An example about this part are available in the file 'CD-PA1010D-Datasheet-v.02.pdf', at page 8, part 1.9.2.2)

## ❙ AlwaysLocate Mode (Advance Power Periodic Mode)

AlwaysLocate™ is an intelligent controller of the Periodic mode; *the main power supply Vcc is still powered up, but power distribution is internally controlled.* **Depending on the environment and motion conditions, the module can autonomously and adaptively adjust the parameters of the Periodic mode, the average current can vary based on conditions.**
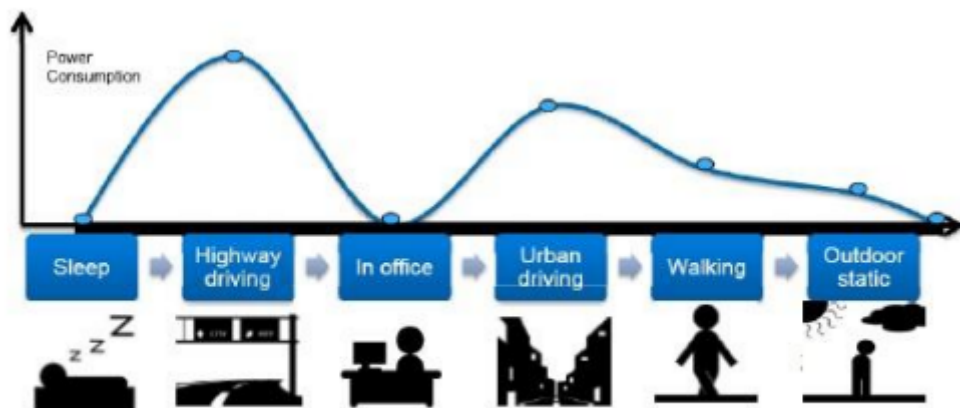


*Figure 1-4: Always Locate*

Enter AlwaysLocate™ mode by sending the following NMEA command: `$PMTK225,Type*CheckSum`

- Type=8: AlwaysLocateTM backup mode, Type=9: AlwaysLocateTM backup mode

The acknowledgement response for the command is: `$PMTK001,225,3*35`
The user can exit low power modes to Full Power by sending NMEA command:
`$PMTK225,0*2B` ( the module wakes up from its previous sleep cycle).

## ❙ Backup Mode

Backup Mode means a **low quiescent power state where receiver operation is stopped.**

The Vcc is **powered on but the current consumption is minimal**. After waking up, *the receiver uses all internal aiding, including GNSS time, Ephemeris, and Last Position*, resulting in the fastest possible TTFF in either hot or warm start modes. During Backup State, **the I/O block is powered off.**

Entering to backup mode is done by a NMEA software command – `$PMTK225,4*2F`

**❗** (More details about this part (command, note and example) are available in the file 'CD-PA1010D-Datasheet-v.02.pdf', at page 8, part 1.9.2.2)

## ❙ Specification

## ❙ Absolute Maximum Ratings

|  | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Power Supply Voltage | VCC | 3.0 | 3.3 | 4.3 | V |
| Backup battery Voltage | VBACKUP | 2.0 | 3.0 | 4.3 | V |