

# Lassen iQ Enhanced Sensitivity

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## Lassen iQ Enhanced Sensitivity Feature

The Lassen® iQ features two sensitivity modes: Standard Sensitivity (default) and Enhanced Sensitivity.

### A.) Standard Sensitivity Mode

In the Standard Sensitivity mode, the receiver acquires GPS satellite signals in Cold Start, Warm Start, and Hot Start TTFF using 1 ms PDI (Pre-Detection Integration) setting to search the frequency range. Considering the fact that the minimum integration time of the GPS signal (1 ms PDI) has been applied, the receiver is optimized for faster acquisition times.

In the standard mode, the default setting for the AMU mask (Amplitude Measurement Unit) is 2. AMU mask establishes the minimum signal strength that the receiver will use for GPS (position, velocity and time) calculations.

Standard Mode → AMU Mask = 2  
PDI = 1 ms

These standard mode settings are the factory recommendations for fastest acquisition and best performance under normal signal conditions.

### B.) Enhanced Sensitivity Mode

Enhanced Sensitivity mode enables the receiver to acquire lower strength GPS satellite signals and generate position fixes under poor signal conditions. When the Enhanced Mode is enabled, the receiver will begin its search for GPS satellite signals using a 1ms PDI acquisition. If no valid GPS satellite signals are detected after one complete frequency search, the receiver will switch to the extended PDI acquisition of 5 ms. Using a longer PDI allows the unit to detect lower level signals but does require longer to complete the frequency search.

In addition to the automatic switch to an extended PDI if needed, the Enhanced Sensitivity mode also uses a lower AMU mask. When Enhanced Sensitivity mode is enabled, the AMU mask is immediately set to the lower value of 1.2. This lower setting allows weaker signals to pass the filters of the GPS system and be used for calculating the position.



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The default AMU mask for the Enhanced Sensitivity is 1.2. The user can change the AMU mask to a different value. When this is done, the receiver will overwrite the default setting of 1.2 and use the selected AMU.

Enhanced Mode → 1) For the first frequency sweep

AMU Mask= 1.2

PDI = 1 ms

2) If the receiver can not acquire after the first frequency sweep

AMU Mask= 1.2

PDI = 5 ms

The user will experience extended startup times

### C.) Extended Startup Times

Due to the extended PDI acquisition in the Enhanced Sensitivity Mode, longer TTFF times (Time to First Fix) is normal. In the Enhanced Sensitivity Mode, the receiver is optimized for increased sensitivity, 6 dB more sensitive than the standard setting, at the cost of the longer startup times. This means that operating in the higher sensitivity mode is a trade-off between the faster start up times of the standard mode versus the higher sensitivity of the Enhanced Sensitivity mode. Therefore, the user must determine for each particular application which sensitivity mode will provide the best performance.

The Tables below demonstrate the comparison between the TTFF times in Standard and Enhanced Sensitivity modes. Please note that the Enhanced Mode is not applicable for Cold Starts.

#### C.1) Standard Sensitivity Mode TTFF Times

Standard Sensitivity Mode Lassen iQ	50% [sec]	90% [sec]
Hot Start	10	13
Warm Start	38	42

#### C.2) Enhanced Sensitivity Mode TTFF Times

Enhanced Sensitivity Mode Lassen iQ	50% [sec]	90% [sec]
Hot Start	24	29
Warm Start	132	309 sec

## Lassen iQ Enhanced Sensitivity

### D.) How to Enable the Enhanced Sensitivity Mode?

#### D.1) New TSIP Command

The Lassen iQ is configured from the factory with the Enhanced Sensitivity feature turned off. A new TSIP (Trimble Standard Interface Protocol) command and a new set of APIs have been generated for switching between the Standard and the Enhanced Sensitivity Modes. You can turn the Enhanced Sensitivity feature on, using

- 1) the iQ Chat program found in the iQ Starter Kit or
- 2) the iQ Monitor program found in the iQ Starter Kit or
- 3) the new TSIP Command Packet 0x69. The Lassen iQ receiver will respond with the new TSIP Response Packet 0x89.

A soft reset is required to make the switch effective.

Here are the details of the Command Packet 0x69 and Report Packet 0x89:

#### D.1.1) Command Packet 0x69 - Set/Request Enhanced Sensitivity Mode

Byte	Item	Type	Value	Definition
0	Enhanced Sensitivity Mode	Byte	0	Off (Standard)
			1	On (Enhanced)
1	Reserved			

#### D.1.2) Report Packet 0x89 - Report Enhanced Sensitivity Mode

Byte	Item	Type	Value	Definition
0	<b>Current</b> Enhanced Sensitivity Mode	Byte	0	Off (Standard)
			1	On (Enhanced)
1	Enhanced Sensitivity Mode <b>After Reset</b>	Byte	0	Off (Standard)
			1	On (Enhanced)

In order to change the receiver to the Enhanced Sensitivity Mode completely and take effect, a soft reset is required. To permanently set the iQ receiver to the Enhanced Sensitivity mode, the settings can be saved to flash memory using the TSIP 8Ex26 Command.

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### D.2) Instructions on how to set the Lassen iQ into Enhanced Sensitivity mode.

Below is a 'typical' scenario using the two packets 0x69 and 0x89:

1. Request the current sensitivity status from a factory configured Lassen iQ
  - Send Packet 0x69 with no data.
  - The iQ will respond with Packet 0x89; byte 0 = 0; byte 1 = 0
2. Turn on the enhanced sensitivity feature
  - Send Packet 0x69 with byte 0 = 1
  - The iQ will respond with Packet 0x89; byte 0 = 0; byte 1 = 1
  - Send Packet 0x25 (soft reset)
  - iQ will respond with Packet 0x45 (Software Version Information)
  - Send Packet 0x69 with no data.
  - iQ will respond with Packet 0x89; byte 0 = 1; byte 1 = 1

At this time the iQ is now in enhanced sensitivity mode until a cold start command is executed or a power cycle is initiated.

3. To set the iQ permanently into the enhanced sensitivity mode
  - Execute the 8Ex26 command before the cold start or power cycle is executed.
  - The 8Ex26 command sets the enhanced sensitivity configuration into flash memory.