

# sensL



**HRMTime**

USB High Resolution Timing Module

## Overview



Dimensions:  
164mm x 96mm

## Portable USB high resolution timing module

SensL's HRMTime is the first portable USB high resolution timing module on the market. It is a highly functional system incorporating high end timing functions in an easy-to-use, flexible and high performance module. The HRMTime provides four channels with 27ps of timing resolution and a maximum data rate of 4.5 mega samples per second over USB to the computer.

DLL libraries and LabVIEW drivers simplify the integration of the HRMTime into any application. The HRMTime is the ideal platform whether your objective is an OEM instrument or an easy-to-use and flexible research tool.

An [OEM version of the HRMTime](#) is also available. This is a single PCB module providing all the features and resolution offered by the standard timing module. [Constant fraction discriminators \(CFD\)](#) are also available to aid integration with a variety of detectors.

## Features

- Picosecond resolution timing
- High-Speed USB 2.0 Interface
- 4 channel system
- DLL, LabVIEW and graphical user interface included
- 16 user configurable I/O pins
- Compatible with external clock inputs (ideal for quantum key distribution applications)
- Scalable platform allows daisy chain of HRMTime to allow large systems to be easily created

## Functionality

- Histogram Multi-Channel Scaler/Counter
- Histogram TCSPC
- FIFO TCSPC with Macro Timing
- FIFO Time Tagging
- Auto/Cross Correlation

## Timing Resolutions

- 27ps time bin (standard)

## Applications

- High-resolution timing measurements
- Quantum Cryptography (QKD)
- Light Detection and Ranging (LIDAR)
- Range Finding
- Fluorescence Lifetime Imaging (FLIM)
- Fluorescence Resonance Energy Transfer (FRET)
- Single Molecule Detection
- Scanning Microarrays
- DNA Biochips and Sequencing
- Optical Diffusion Tomography (ODT)
- Fluorescence Correlation Spectroscopy (FCS)
- Optical Oscilloscope

### Specifications

Inputs / Outputs	
Supply Voltage	5V @ 0.65A (supplied from supplied AC power adapter)
Start and Stop	TTL - SMA connector x 2 (per channel)
Temperature	Operating: 0°C to +50°C; Storage: -20°C to +70°C
I/O Ports	16 general purpose I/Os, User configurable LVTTTL (3.3V)
USB	High speed USB 2.0 (miniature connector)
Programmable Clock	TTL 50Ω SMA output up to 100MHz
System Overview	
No. of Channels	4
System Memory	8MB Fast SRAM
Dead time	190ns
Minimum Input Pulse Width (Start/Stop)	1.5ns (TTL)
Host PC/Operating System	Windows XP, Min. 1.5 GHz and 5MB RAM and high-speed USB
Dimensions (LxWxH)	164mm x 96mm x 34mm

### Operating Modes

Histogram: Multi-Channel Scaler/Counter and Histogram: TCSPC

Min Time Bin Size <sup>1</sup>	27ps
Max Time Bin Size	143μs
Max No. of Time Bins	4,194,304
Time Bin Depth	2 <sup>16</sup> or 2 <sup>32</sup>
Max Useable Count Rate <sup>2</sup>	4.5Mcps
Max Image Size	2048 x 2048

<sup>1</sup> Variable with included software

<sup>2</sup> Total across all channels (1, 2 or 4 channels)

<sup>3</sup> Chronological timing

<sup>4</sup> PC hardware dependent

<sup>5</sup> USB interface supports count rates of >5Mcps

FIFO: TCSPC with MACRO Timing

Least Significant Bit <sup>1</sup>	27ps	
Timing Resolution (Macro) <sup>3</sup>	5ns	
Max No. of Photons <sup>4</sup>	Infinite	
Max Useable Count Rate	at the FIFO <sup>2</sup>	4.5Mcps
	at the PC <sup>5</sup>	PC hardware dependent
No. Bits per Time Tag	32	
Max No. of Time Tags to Memory	2,097,152	

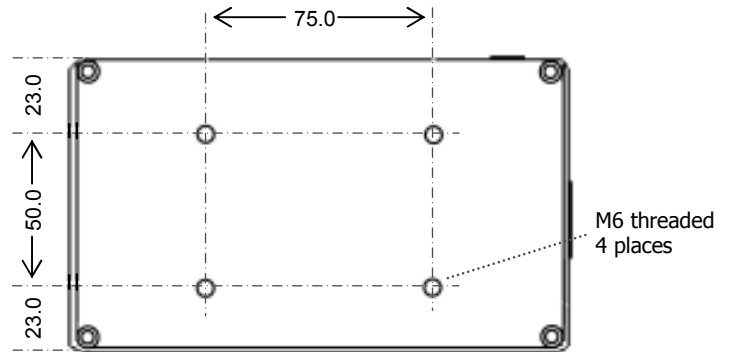
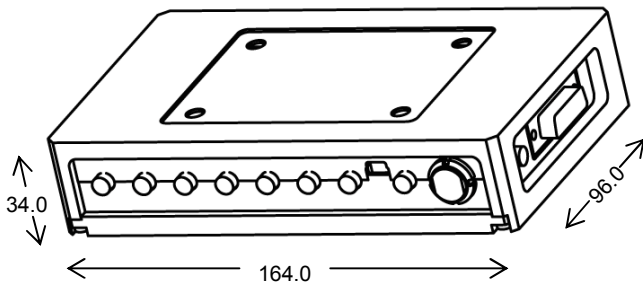
FIFO: Time Tagging

Least Significant Bit (Micro)	27ps	
Max No. of Photons <sup>4</sup>	Infinite	
Max Useable Count Rate	at the FIFO <sup>2</sup>	4.5Mcps
	at the PC <sup>5</sup>	PC hardware dependent
No. Bits per Time Tag	64	
Max No. of Time Tags to Memory	1,048,576	

**Note:** SensL reserves the right to change all product specification and functionality without notification. Information on this datasheet is believed to be accurate, however, no responsibility is assumed for any inaccuracies or omissions.

## Mechanical Information

Overall dimensions: 164mm (L) x 96mm (W) x 34mm (H)



## Signal Inputs and Outputs



- A** Channel 0 Start Input (SMA TTL)
- B** Channel 0 Stop Input (SMA TTL)
- C** Channel 1 Start Input (SMA TTL)
- D** Channel 1 Stop Input (SMA TTL)
- E** Channel 2 Start Input (SMA TTL)
- F** Channel 2 Stop Input (SMA TTL)
- G** Channel 3 Start Input (SMA TTL)
- H** Channel 3 Stop Input (SMA TTL)
- I** USB connector
- J** LEMO power supply connector (for SensL PSU use only)
- K** 16-way I/O port connector
- L** Programmable Clock output (SMA TTL 50 ohm)

## Ordering Information

Product Code	Description
HRMTime4	4-Channel High Resolution Timing Module with 432ps Time Bin, Full Software Functionality, DLLs and LabVIEW Drivers
Options	
W-HRMTime	Option: HRMTime 3-Year Extended Warranty