

Degree Level Training in Photon Timing

SensL's PCEdu-1T is an upgrade package that complements and builds on the training provided by SensL's PCEdu-1 Photon Counting Fundamentals Educator Pack. PCEdu-1 provides an entry level lecture and laboratory series which is the ideal solution for academics or OEM's looking to launch a low light sensing, photon counting or semiconductor device physics training module.

The PCEdu-1T takes the training to a higher level with a series of lectures and lab experiments dealing with real photon timing scenarios. The upgrade pack contains a range of tools and documentation that will bring the user through a number of steps, from the basic theory of photon timing to application examples such as fluorescence life-time imaging microscopy (FLIM) and time correlated single photon counting that utilise photon timing (TCSPC). The structured and detailed application notes combined with SensL's Timing Module hardware and software makes this the complete tutorial package for anyone looking to quickly engage in the exciting world of photon counting and timing.

Theory and Lecture Notes

Structured lecture notes take the trainee through three detailed modules, each with specific learning objectives that prepare the trainee for the practical labs that follow.

The major topics covered are:-

- Module 1 - Photon Timing Principles and Applications
- Module 2 - Time Correlated Single Photon Counting
- Module 3 - Fluorescence Lifetime Measurements

Interactive Labs and Experiments

Complementing the theory modules are 3 lab sessions designed to evaluate and confirm the theories of photon timing. With detailed illustration and step by step instructions the lab sessions enable the trainee to gain a first hand experience of working with real production quality photon timing and low light sensing devices.

The concepts evaluated include:-

- Lab 1 - Multi-Scalar Analyser techniques
- Lab 2 - Time Correlated Single Photon Counting measurement examples
- Lab 3 - Fluorescence Lifetime Measurement examples



Included Hardware

All items necessary to perform a range of experiments to familiarise the participant in the area of Photon Timing

- SensL Photon Timing Module
- Leads, connectors and power supply cables
- User Manual
- Installation CD
- SensL Integrated Software Environment

Note: PCEdu-1T is an upgrade package for the SensL PCEdu-1 Photon Counting Fundamentals Educator Pack. Hardware from the PCEdu-1 is required for use with this Upgrade Pack.

Lab Equipment Requirements

The following additional items of hardware and software are required to conduct the experiments.

- Standard PC with Windows XP
- Bench Power Supply
- Ammeter
- Oscilloscope, 100MHz min
- SiMetrix Circuit Simulation Software
 - Free Download from www.catena.uk.com

Photon Counting Fundamentals

See datasheet PCEdu-1 for details of SensL's Photon Counting Fundamentals Educator Pack

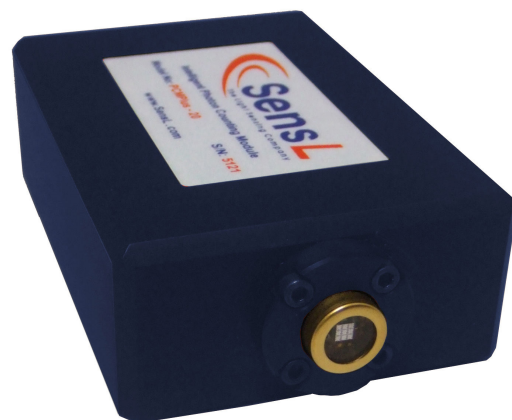
Description and Specifications

The SensL Photon Timing Module (PTM) is a complete photon timing system solution in a single module and incorporates the latest high performance Geiger mode photodiode, on-board microprocessors, and high speed USB 2.0 interface.

The PTM integrates a low jitter photon counting sensor, counting and time stamping hardware and incorporates timing analysis software into a single solution. The system functionality includes time resolution (time tagging) down to 2.5ns, time binning multi-channel scalar/averager (MCS/MCA) and time correlated single photon counting (TCSPC). The photon counting sensor has a timing jitter of <130ps and a peak quantum efficiency of 30%.

Easy system set-up, control and data acquisition is achieved through a built-in USB 2.0 PC connection and included Java analysis software. The complete solution in a single module means that it is no longer necessary to be an optics or electronics expert to implement high resolution photon timing.

The sensor is mounted on a peltier cooler and enclosed in a hermetically sealed package. The detector is based on new shallow junction Geiger-mode avalanche photodiode technology. Several advantages in this detector structure over competing systems include increased sensitivity to blue-red wavelengths, increased response time (timing jitter) to fast optical signals and low operating voltages. This increases sensitivity for critical biomedical applications and allows fast fluorescence decay signals to be measured with unparalleled accuracy from an affordable compact unit.



General Specifications @ Room Temp

Parameter	Typ	Units	Notes
Spectral range	400 - 900	nm	
Active area	20	um	
Time-tagging: Number of Time-tags Size of Time-tag Resolution	524288 32 2.5 - 320	bits ns	Resolution is Programmable
Time-Bins: Number of Time-bins Depth of Time-bins Resolution	1048576 65536 2.5 - 320	ns	Resolution is Programmable
Jitter	140	ps	
Time-walk	50	ps	10kcps to 1Mcps
Dark count	400	cps	Dark count @ 25°C
Peak Quantum Efficiency	30	%	Max QE @ -20°C, 550nm – 650nm
Peak afterpulsing	1.0	%	
Output pulse amplitude	2.5	V	50Ω load
Maximum count	10	Mcps	Continuous light

Applications of Photon Timing

- Fluorescence lifetime measurements
- Scanning microarrays
- DNA biochips/sequencing
- Photon Correlation Spectroscopy
- Confocal microscopy
- Scientific Instrumentation

About SensL

SensL is a private company designing and commercializing revolutionary technology in low light sensing and imaging. Based in Cork, Ireland, SensL has become a global leader with core technology consisting of a range of silicon based low light detectors, modules and systems for applications that use visible low light detection. Based on new silicon fabrication technologies, novel device geometries, and new control circuit design, SensL provides higher specification devices than currently available on the market. Targeted applications include those currently using single photon counting and photomultiplier tube (PMT) technology. The main advantages of SensL's technology are low operating voltage, no excess light damage, high quantum efficiency and low timing jitter. Additionally SensL's detectors are fabricated using CMOS compatible processing steps enabling full electronics integration.

Sales Channels and Partners

Europe, Middle East, Africa

Belgium

Laser 2000 BeNeLux S.A.
Rue du Moulin 18
5650 Fraire
tel: +32 / 71 61 06 40
email: sales@laser2000.be
web: www.laser2000.be

Israel

Lahat Technologies Ltd.
Teradion Industrial Zone
Misgav 20179
tel: +972 4 9990151
email: sales@lahat.co.il
web: www.lahat.co.il

Spain

LASERTechnology, S.L.
Poligono Industrial "LaBailleta", CalleB
Nave 8—08348 Cabrils, Barcelona
tel: +34 93 750 0121
email: info@laser-technology.com
web: www.laser-technology.com

United Kingdom

Laser 2000 (UK) LTD
Britannia House, Denford Road
Ringstead, Kettering, NN14 4DF
tel: +44 (0)1933 461 666
email: sales@laser2000.co.uk
web: www.laser2000.co.uk

France

Laser 2000 S.A.S.
Parc d'Affaires ,3 rue de la Plaine
78860 Saint-Nom la Bretèche
tel: +33 / 1 / 30 80 00 60
email: info@laser2000.fr
web: www.laser2000.fr

Italy

UNIFIBRE s.r.l.
Via Salvemini 17
20019 Settimo Milanese (MI)
tel: +39 02 33 55 501
email: uniteam@unifibre.it
web: www.unifibre.it

Sweden

Laser 2000 AB
Box 799
601 17 Norrköping
tel: +46 11 369681
email: info@laser2000.se
web: www.laser2000.se

Germany

Laser 2000 GmbH
Argelsrieder Feld 14
D-82234 Wessling, München
tel: +49 8153 405 0
email: contact@laser2000.de
web: www.laser2000.de

Netherlands

Laser 2000 BeNeLux C.V.
Voorbancken 13a, PO Box 20
3645 ZJ Vinkeveen
tel: +31 / 297 / 266 191
email: info@laser2000.nl
web: www.laser2000.nl

Switzerland

GMP SA
Av. Des Baumettes 17
CH-1020 Renens
tel: +41 21 633 21 21
email: info@gmp.ch
web: www.gmp.ch

USA, Canada

USA (West Coast)

Market Tech, Inc.
P.O. Box 67037, Scotts Valley,
CA 95067-7037
tel: +1-800-326-5714
email: info@markettechinc.net
web: www.markettechinc.net

Canada

Gamble Technologies Ltd.
6535 Millcreek Drive, Unit #58
Mississauga, ON L5N 2M2
tel: +1 905 812 9200
email: info@gtl.ca
web: www.gtl.ca

Asia-Pacific

Korea

SeongKyeong Photonics.
Ma-220, 399-8, Daeduk Hi-tech B/D, Doryong-dong,
Yuseong-gu, Daejeon, 305-340
tel: +82 42 867-2227
email: yoonsk@skphotonics.com
web: www.skphotonics.com

China

Shanghai Weining Technology Development Co., Ltd.
1138 Changan Road, Suite 24D,
Chongfang East China Tower, Shanghai, 200070
tel: +86 21 5106 8395
email: jamesxu2005@126.com
web: www.weiningtech.com

Japan

Tokyo Instruments, Inc.
6-18-14 Nishi-Kasai, Edogawa-Ku
Tokyo 134-0088
tel: +81 3 3686 4711
email: sales@tokyoinst.co.jp
web: www.tokyoinst.co.jp