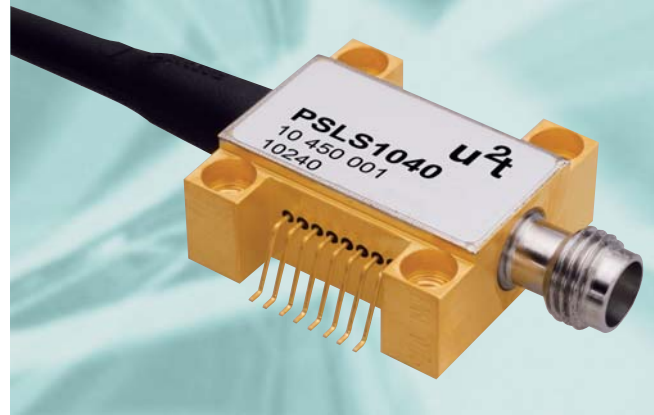


Pico-Second Laser Source

Product Code: PSLs 1040 / 1042 / 1043 / 1053



Product Description

- The Pico-Second Laser Source (PSLS) consists of a monolithically integrated mode-locked laser chip mounted on a submount for temperature stabilization. The module is packaged in a compact, surface mountable module with single mode fiber pigtail and V Connector®.
- The laser utilizes a multi-section Semi-Insulating Planar Buried Heterostructure (SIPBH) MQW laser structure on GaInAsP / InP. The device integrates a gain and absorber section and is configured in an in-line extended cavity configuration.
- The device allows for hybrid mode-locking. Under hybrid mode-locking the pulse repetition rate is locked to an electrical clock signal with a required RF power of only 10 ... 15 dB_m. This results in an extremely stable and robust operation with low amplitude noise as well as high pulse-to-pulse phase stability.

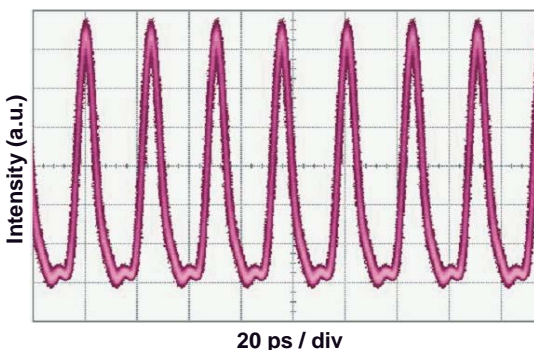
Features

- Monolithic mode-locked laser
- 1.5 ps pulse width
- 39.813 GHz, 42.657 GHz or 53.5 GHz repetition rate
- Specific repetition rates in 43 GHz range available
- Synchronized to electrical RF clock signal
- Compact surface mountable module
- Low jitter and high stability

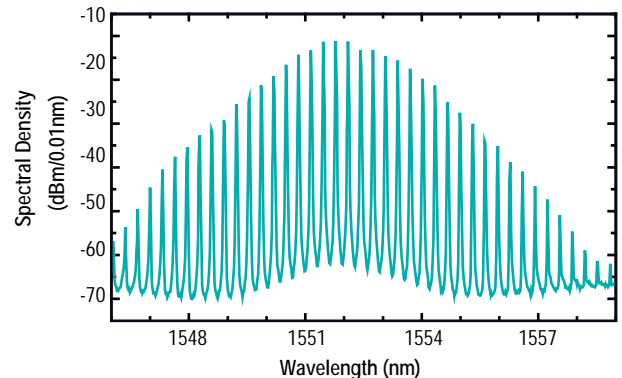
Applications

- Optical clock for OC-768 or OC-768 FEC RZ transmission
- Optical time domain multiplexing up to 160 Gbit/s (including applications of advanced D(Q)PSK modulation formats)

Typical Performance



This diagram shows a typical pulse trace with a repetition rate of 39.813 GHz and an extinction ratio of > 25 dB, achieved without utilizing any external filter elements.



This figure demonstrates the high pulse-to-pulse phase stability of the output pulse train. An optical spectrum contrast ratio (OSCR) of larger than 50 dB is achieved.

V Connector® is a registered trademark of Anritsu Company.

Absolute Maximum Ratings

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward gain current	I_{gain}				200	mA
Reverse bias voltage	V_{sa}				3.0	V
RF input power					20	dBm
TEC current					1.8	A
Average output power	P_{opt}				5	dBm
Storage temperature	T_{stg}	non condensing	-40		85	°C
Fiber bend radius			30			mm

Operation Conditions

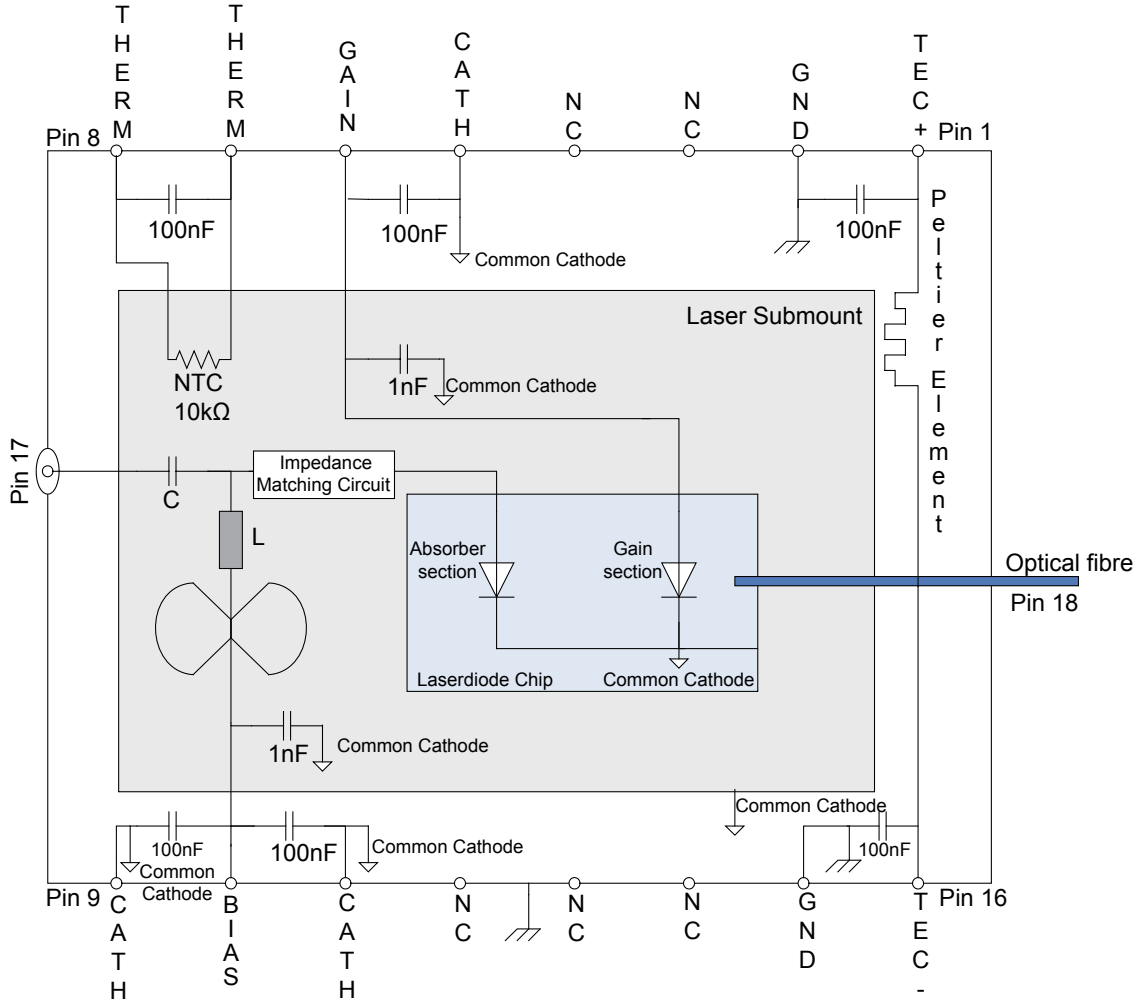
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Repetition rate	f_{rep}	PSLS1040 PSLS1042 PSLS1053 PSLS1043	42.75	39.81 / 42.66 / 53.5	43.3	GHz
Forward gain current	I_{gain}		50		175	mA
Reverse bias voltage	V_{sa}		0.5	1	2.8	V
RF input power			12	15	18	dBm _{el}
Laserdiode controller temperature setting	T	4)	10		25	°C

Optical and Electrical Specifications

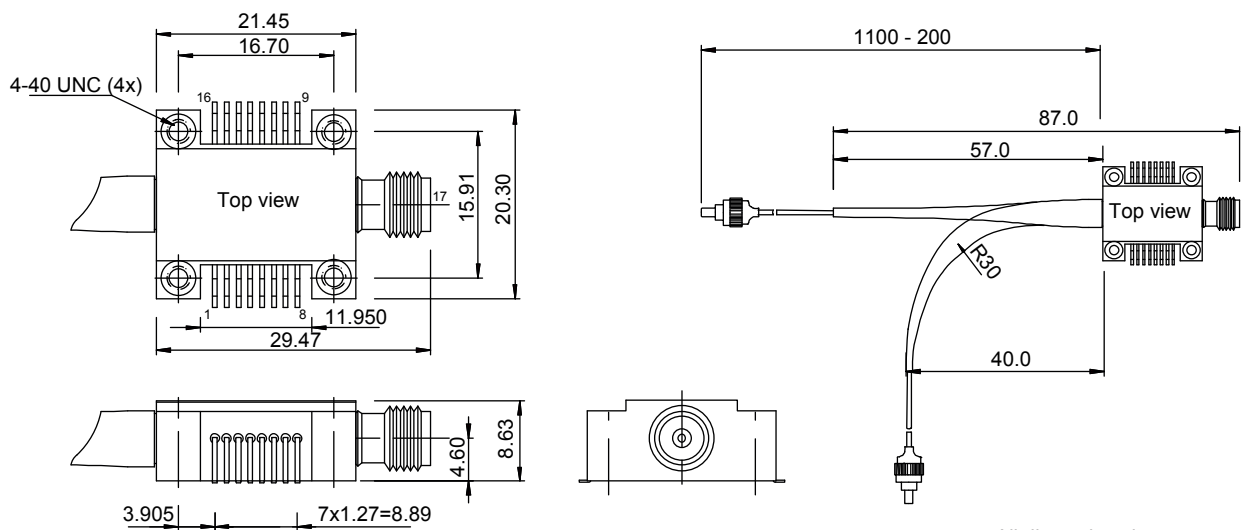
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Center wavelength	λ_c		1545	1553	1555	nm
Repetition rate tuning	Δf_{rep}	1)	-200		200	MHz
Locking bandwidth				150		MHz
Average output power	P_{opt}	2)	-3	0	3	dBm
Pulse width (FWHM)	τ		1.2	1.8	2.5	ps
Time bandwidth product	$\Delta \nu * \tau$		0.35		0.55	
Optical bandwidth	$\Delta \lambda$		1.5		1.9	nm
RMS timing jitter		3)		200 (80)	300	fs
Amplitude noise	AN			2	3	%
Reverse bias current	I_{sa}			15	30	mA
TEC voltage				1.8		V
Thermistor resistance	R_{TH}	5)	9.5	10	10.5	k Ω

- Notes:
- 1) Repetition rate tuning only by changing absorber and gain bias conditions.
 - 2) At T=20°C: In optical fibre; depending of the point of operation.
 - 3) Combined phase noise of Agilent 83650B synthesizer, mode-locked laser and Agilent 8565EC rf-spectrum analyser. The rms timing jitter was determined from SSB phase noise measurements with an integration range from 100 Hz to 10 MHz offset from the carrier frequency. The value in brackets is measured with the low-noise 50GHz Anritsu signal generator MG3695A with Opt. 03.
 - 4) As set by the required temperature controller.
 - 5) At T=25°C; Steinhart-Hart coefficients: C1 = 1.0284 * 10⁻³; C2 = 2.3924 * 10⁻⁴; C3 = 1.5622 * 10⁻⁷.

Block Diagram

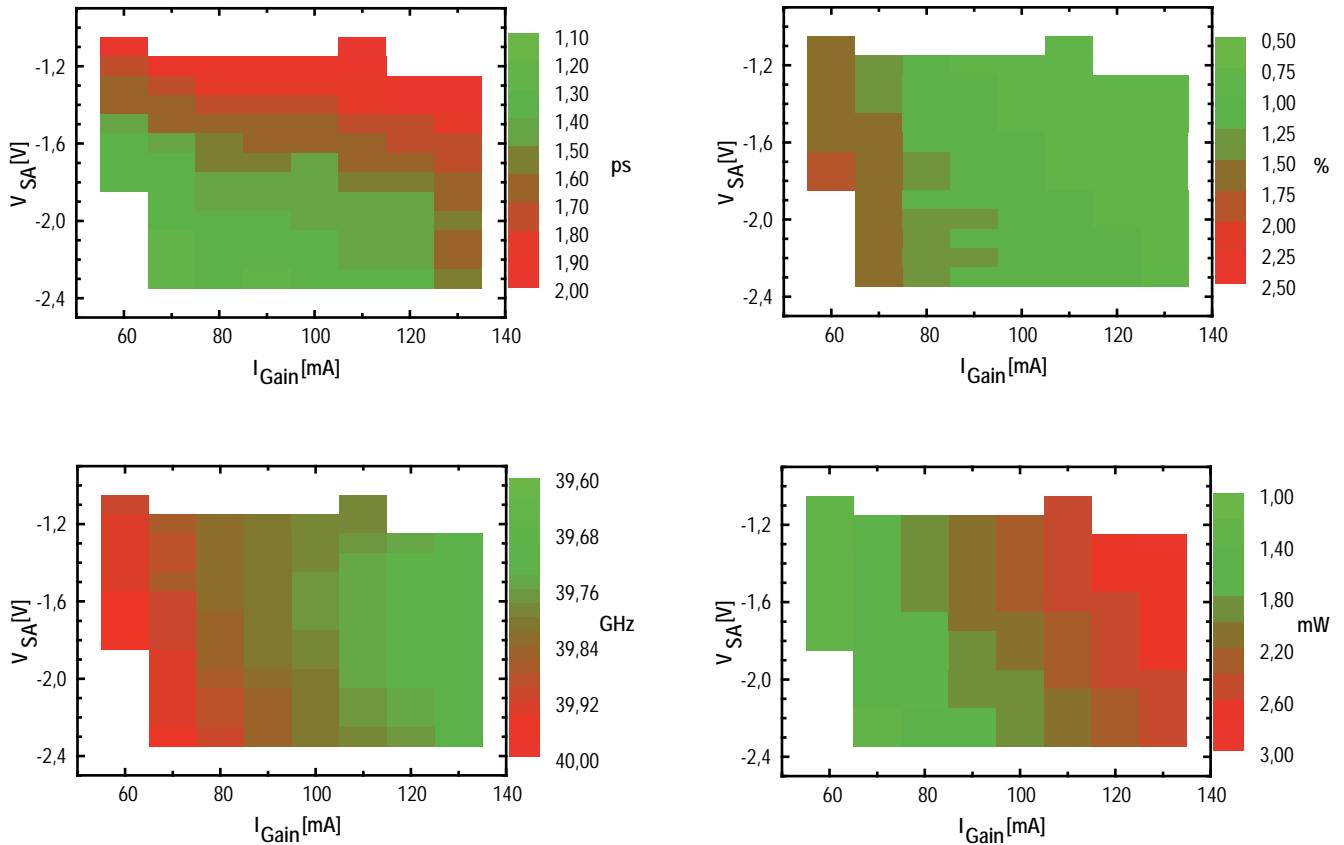


Mechanical Dimensions



All dimensions in mm.

Module Characteristics Map



The diagrams above show the area of mode-locking in the plane of absorber voltage und gain current. For this representation only bias conditions have been taken into account, which result in a pulse width < 2 ps, amplitude noise < 2.5 % and a repetition rate between 39.6 GHz and 40.0 GHz (PSLS1040). These diagrams are provided with each module and allow an easy set-up for the desired point of operation.

Handling and power up sequence

Like all semiconductor laser the module needs to be handled carefully with respect to electrostatic discharge.

Attention! Do not switch on the RF external clock before laser is powered on according to the following sequence:

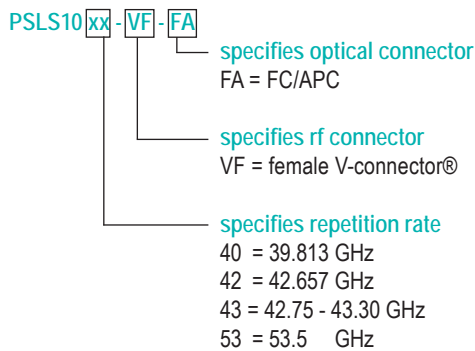
1. Switch on temperature control (20 to 25°C)
2. Switch on laser diode → gain section (~50-140mA)
3. Switch on DC bias, absorber section (~0.5-2.5V reverse)
4. Apply rf signal frequency according product spec with rf input power of 12-18dBm

Accessories

The u2t Evaluation Kit EVA-PSLS serves as an easy-to-use utility to mount the 16-pin surface mountable package and a specialized cable set, to connect the adapter board with a standard ILX laserdiode controller or an ILX temperature controller together with an ILX current controller. For the required reverse bias voltage to be applied to the absorber section, the cable set offers two banana plugs which can be used with any low-noise voltage supply.

Ordering Information

Please use the following table to select your required configuration of the photoreceiver.



For the Evaluation kit please use the following code.



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