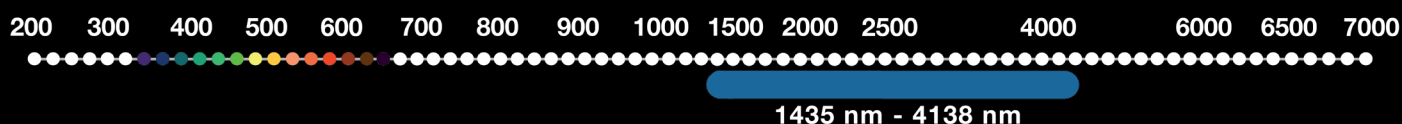


# Broadly Tunable Laser in the Mid-IR

With integrated computer-controlled OPO for continuous tuning across 1435 - 4138 nm ( $6969 - 2416 \text{ cm}^{-1}$ )\*



## Titan



### KEY FEATURES

- Wide wavelength tuning across 1435 - 4138 nm ( $6969 - 2416 \text{ cm}^{-1}$ )\*
- Simultaneous Outputs: All
- Average Power Models: High Power ( $>4 \text{ W}$ )
- Linewidth: Signal  $<1 \text{ MHz}$ , Idler  $<10 \text{ MHz}$
- Higher Power Models Available
- Built-in pump

### APPLICATIONS

- Action Spectroscopy.
- Cavity Ring-Down Spectroscopy.
- Device Characterisation.
- Frequency Conversion.
- Gas Sensing.
- Laser Cooling and Trapping.
- Mid-IR Communications.
- Photon Entanglement.

## Description

The extraordinary Titan is the pioneer commercial mid-infrared continuous-wave optical parametric oscillator (CW OPO). Introduced to the market in 2018, Titan delivers continuously tunable output wavelengths in the mid-IR, across 1435 - 4138 nm ( $6969\text{--}2416\text{ cm}^{-1}$ )\*. The full spectral range is achieved with a single set of optics without the need to exchange any module.

Radiantis' unique expertise in frequency converted lasers has enabled the exceptional design of the Titan OPO family. As a sealed and fully-automated system, with excellent  $\text{TEM}_{00}$  beam quality ( $M^2 < 1.3$ ) and beam pointing stability ( $< 40\text{ }\mu\text{rad}$ ), Titan delivers high CW output power ( $> 4\text{ W}$  at the peak of the tuning range) with a linewidth  $< 1\text{ MHz}$  in the signal range and  $< 10\text{ MHz}$  in the idler.

Hands-free operation is ensured thanks to the all-digital control electronics and user control software which can be accessed through the PC GUI interface installed on a dedicated laptop delivered with the OPO. Titan can also be controlled via remote commands.

Titan integrates 4 key modules: 1) a rack DFB fiber laser and amplifier unit, 2) the OPO optical head, 3) a rack OPO all-digital control electronics and 4) a rack compact water-cooler. The fiber laser, the OPO control electronics and the water cooler are rackable. The OPO optical head needs to be positioned on an optical table to reduce vibrations and ensure maximum stability.

The broad wavelength range, narrow linewidth, and fully-automated tunability across the mid-IR enables cutting-edge research in diverse areas such as spectroscopy and microscopy for biotechnology, fundamental physics and chemistry, as well as material characterisation, device calibration and quantum technologies.

Several Titan models are available which provide different characteristics of average output power and wavelength coverage, as detailed in the specification table below.

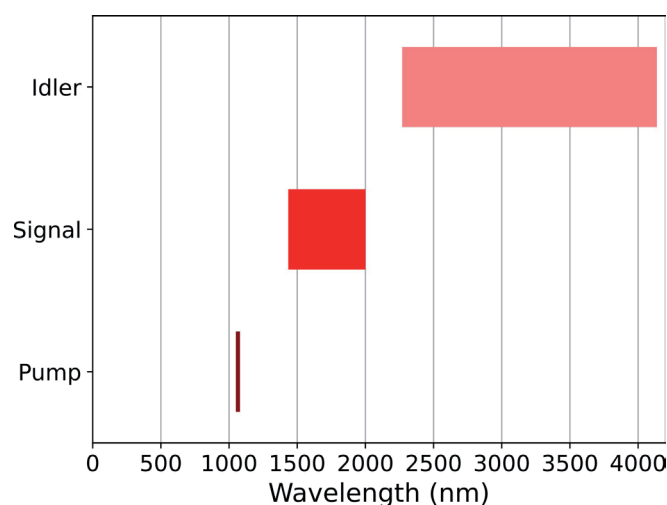
## Titan Wavelength Coverage

### Output Ports

Titan incorporates two output ports:

- Signal      1435 - 2000 nm  
( $5000\text{--}6969\text{ cm}^{-1}$ )
- Idler        2270 - 4138 nm  
( $2416\text{--}4405\text{ cm}^{-1}$ )

This superior spectral coverage is provided with exceptional output power across the entire range ( $> 4\text{ W}$  at peak wavelength).

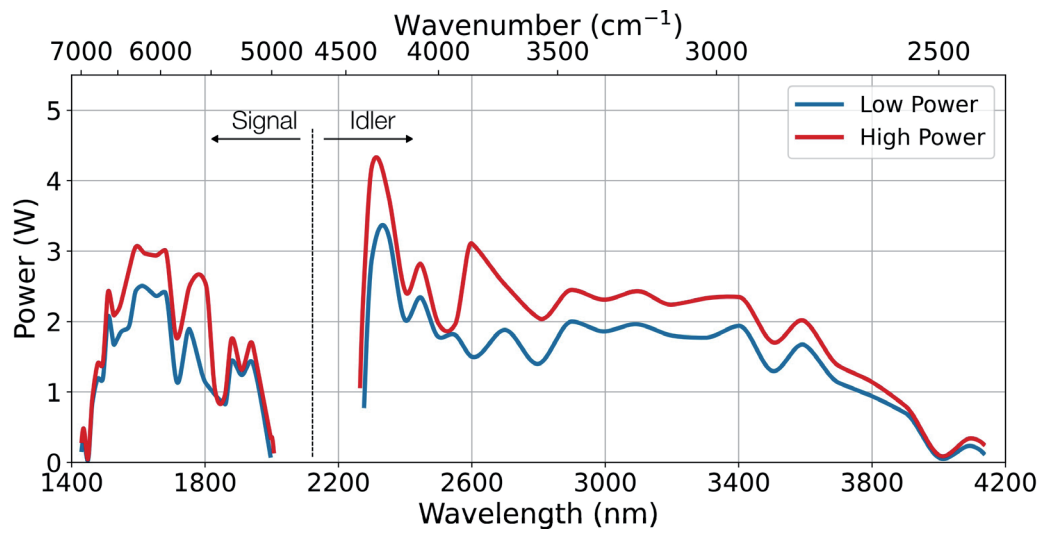


## Specifications<sup>(1)</sup>

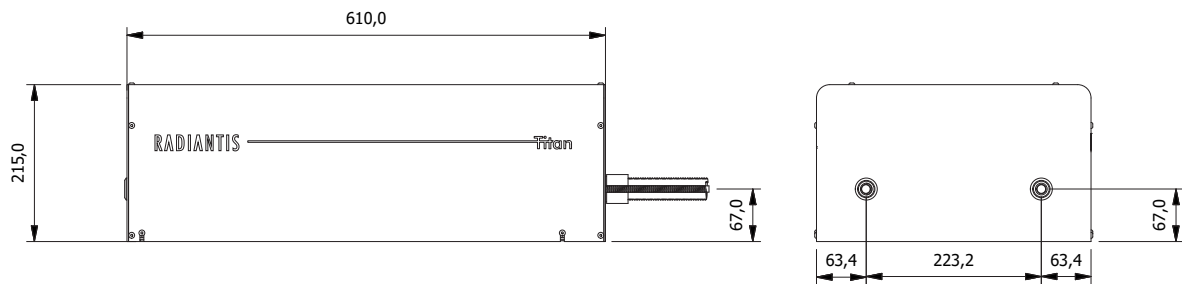
| Output Characteristics               | Titan LP                                          | Titan HP                                          |
|--------------------------------------|---------------------------------------------------|---------------------------------------------------|
| <b>Tuning Range</b>                  |                                                   |                                                   |
| Signal output                        | 1435 - 2000 nm<br>(5000 - 6968 cm <sup>-1</sup> ) | 1435 - 2000 nm<br>(5000 - 6968 cm <sup>-1</sup> ) |
| Idler output                         | 2270 - 4138 nm<br>(2416 - 4405 cm <sup>-1</sup> ) | 2270 - 4138 nm<br>(2416 - 4405 cm <sup>-1</sup> ) |
| <b>Output Power<sup>(2)(3)</sup></b> |                                                   |                                                   |
| Signal output                        | > 1.5 W                                           | > 2.5 W                                           |
| Idler output                         | > 2.5 W                                           | > 4 W                                             |
| <b>Linewidth</b>                     |                                                   |                                                   |
| Signal output                        | <1 MHz                                            | <1 MHz                                            |
| Idler output                         | <10 MHz                                           | <10 MHz                                           |
| <b>Beam Parameters</b>               |                                                   |                                                   |
| Beam diameter at 1650 nm             | <3.0 mm                                           | <3.0 mm                                           |
| Beam diameter at 3000 nm             | <3.0 mm                                           | <3.0 mm                                           |
| Spatial mode                         | TEM <sub>00</sub> (M <sup>2</sup> ≤ 1.3)          | TEM <sub>00</sub> (M <sup>2</sup> ≤ 1.3)          |
| Beam pointing signal                 | <80 μrad                                          | <80 μrad                                          |
| Beam pointing idler                  | <20 μrad                                          |                                                   |
| Beam displacement with tuning idler  | <0.3 mm                                           |                                                   |
| <b>Polarization</b>                  |                                                   |                                                   |
| Signal                               | Linear - Horizontal                               | Linear - Horizontal                               |
| Idler                                | Linear - Horizontal                               | Linear - Horizontal                               |
| <b>Power stability</b>               |                                                   |                                                   |
| Signal                               | <0.5% rms <sup>(5)</sup>                          | <0.5% rms <sup>(5)</sup>                          |
| Idler                                | <0.5% rms <sup>(6)</sup>                          | <0.5% rms <sup>(6)</sup>                          |
| Size (W x L x H)                     | 610 x 350 x 200 mm<br>(24.0 x 13.8 x 7.9 inch)    |                                                   |

Notes: (1) Specifications are subject to change without notice. (4) Across the full spectral range.  
 (2) At Peak of OPO tuning range. (5) At 1478 nm.  
 (3) Higher powers available on request. (6) At 3800 nm.

## Titan Typical Tuning Curve



## Dimensions



**Notes:** Dimensions in mm.