Picosecond Lasers

#### NT230 • NT235 • NT242 • NT200 • NT342 • NT350 • NT370

## NT350 SERIES



NT352 series tunable laser seamlessly integrates in a compact housing a nanosecond optical parametric oscillator and Nd:YAG Q-switched laser.

Four models with different output pulse energy values are offered. The most powerful model has more than 125 mJ pulse energy at 800 nm.

Narrow linewidth (<10 cm<sup>-1</sup>) is nearly constant trough whole tuning range, which makes laser suitable for many spectroscopy application.

The device is controlled from the remote keypad or from PC through RS232 interface using LabVIEW™ drivers that are supplied with the system. The remote pad features a backlit display that is easy to read even while wearing laser safety glasses.

System is designed for easy and cost-effective maintenance.
Replacement of flashlamps can be done without misalignment of the laser cavity and deterioration of laser performance. OPO pump energy monitoring system helps to increase lifetime of the optical components.

Optional items are available allowing to optimize the laser system for Your application, for example:

- ► Fiber coupled output in 670–1000 nm range;
- ► Tuning range extension up to 2600 nm:
- Efficient second harmonics generator for 335–500 nm range;
- ▶ Pulse energy attenuator;
- ► Water-air cooled power supply. Please inquire custom-build versions and options.

### High Energy NIR Range Tunable Lasers

#### **FEATURES**

- Hands-free, automated wavelength tuning from 670 to 2600 nm
- ▶ Up to 125 mJ pulse energy in near-IR spectral range
- Narrow linewidth across tuning range
- ▶ **3-5** ns pulse duration
- ▶ Up to **30 Hz** pulse repetition rate
- ► Remote control pad
- ► PC control via RS232 and LabVIEW™ drivers
- ➤ Separate output port for 532 nm beam. Output for 1064 nm is optional
- ▶ OPO pump energy monitoring
- Replacement of the flashlamps can be done without misalignment of the laser cavity
- Hermetically sealed oscillator cavity protects non-linear crystals from dust and humidity

#### APPLICATIONS

- ▶ Photoacoustic imaging
- ▶ Photobiology
- Remote sensing
- ► Time-resolved spectroscopy
- ▶ Non-linear spectroscopy
- Other laser spectroscopy applications



#### SPECIFICATIONS 1)

Signal   G70 - 1064 nm   Idler   1065 - 2600 nm   SH   355 - 500 nm   SH   SH   SH   SH   SH   SH   SH   S	Model	NT352	NT352A	NT352B	NT352C	
Signal	OPO					
Idler	Wavelength range					
SH 355 - 500 nm  Dutput pulse energy  OPO 2 30 mJ 60 mJ 100 mJ 125 mJ  inewidth	Signal		670-1064 nm			
Dutput pulse energy	Idler	1065-2600 nm				
OPO 3	SH	355-500 nm				
Signal (670 – 1064 nm)	Output pulse energy	'				
Signal (670 – 1064 nm)	OPO <sup>2)</sup>	30 mJ	60 mJ	100 mJ	125 mJ	
Signal (670 – 1064 nm)	Linewidth	<10 cm <sup>-1</sup>				
Sear   Color	Scanning step					
Pulse duration 3	Signal (670–1064 nm)	0.1 nm				
Pulse duration 3	Idler (1064-2300 nm)	1 nm				
Signal beam diameter   Signal beam diameter   Signal beam divergence   Signal beam divergence   Signal beam   Si	SH (355-500 nm)	0.5 nm				
Variable	Pulse duration <sup>3)</sup>	3–5 ns				
Polarization   Signal beam   horizontal     Idler beam   vertical     Polarization	Typical beam diameter 4)	6 mm	8 mm	10 mm	12 mm	
Signal beam horizontal Idler beam vertical  PUMP LASER 6)  Pump wavelength 532 nm  Max pump pulse energy 110 mJ 230 mJ 400 mJ 500 mJ  Pulse duration 4 - 6 ns  Beam quality Hat-Top in near field. Close to Gaussian in far field  Beam divergence < 0.5 mrad  Pulse energy stability (StdDev) < 2.5 %  Pulse repetition rate 10 or 20 Hz 7) 10 or 20 Hz 10 Hz 7)  PHYSICAL CHARACTERISTICS  Unit size (W × L × H) 452 × 610 × 270 mm 452 × 1020 × 270 mm  Power supply size (W × L × H) 330 × 490 × 585 mm 550 × 600 × 530 mm  Umbilical length 2.5 m  DPERATING REQUIREMENTS  Water consumption (max 20 °C) 8) 6 l/min 10 l/min  Room temperature 15 – 30 °C  Relative humidity 20 80 or 240 V AC, single phase 50/60 Hz	Typical beam divergence 5)	<2 mrad				
Idler beam vertical  PUMP LASER 6)  Pump wavelength 532 nm  Max pump pulse energy 110 mJ 230 mJ 400 mJ 500 mJ  Pulse duration 4 - 6 ns  Beam quality Hat-Top in near field. Close to Gaussian in far field  Beam divergence < 0.5 mrad  Pulse energy stability (StdDev) < 2.5 %  Pulse repetition rate 10 or 20 Hz 7) 10 or 20 Hz 10 Hz 7)  PHYSICAL CHARACTERISTICS  Unit size (W × L × H) 452 × 610 × 270 mm 452 × 1020 × 270 mm  Power supply size (W × L × H) 330 × 490 × 585 mm 550 × 600 × 530 mm  Umbilical length 2.5 m  DPERATING REQUIREMENTS  Water consumption (max 20 °C) 8) 6 l/min 10 l/min  Room temperature 15 – 30 °C  Relative humidity 20 = 0.80 % (non-condensing)  Power requirements 9) 208 or 240 V AC, single phase 50/60 Hz	Polarization	'				
PUMP LASER 6) Pump wavelength  Max pump pulse energy  110 mJ  230 mJ  400 mJ  500 mJ  201 sed uration  4 - 6 ns  Beam quality  Hat-Top in near field. Close to Gaussian in far field  Pulse energy stability (StdDev)  Pulse energy stability (StdDev)  Pulse repetition rate  10 or 20 Hz 7)  10 or 20 Hz  10 or 20 Hz  PHYSICAL CHARACTERISTICS  Unit size (W × L × H)  Power supply size (W × L × H)  330 × 490 × 585 mm  550 × 600 × 530 mm  Dimbilical length  2.5 m  DEFRATING REQUIREMENTS  Water consumption (max 20 °C) 8)  A significant of the minimum	Signal beam	horizontal				
Pulse duration  Aux pump pulse energy  110 mJ  230 mJ  400 mJ  500 mJ  Pulse duration  4 - 6 ns  Beam quality  Hat-Top in near field. Close to Gaussian in far field  Geam divergence  4 - 6 ns  Beam divergence	Idler beam	vertical				
Max pump pulse energy  110 mJ  230 mJ  400 mJ  500 mJ  Pulse duration  4 - 6 ns  Beam quality  Hat-Top in near field. Close to Gaussian in far field  Coulse energy stability (StdDev)  Pulse energy stability (StdDev)  Pulse repetition rate  10 or 20 Hz 7)  10 or 20 Hz  10 Hz 7)  PHYSICAL CHARACTERISTICS  Unit size (W × L × H)  452 × 610 × 270 mm  452 × 1020 × 270 mm  Power supply size (W × L × H)  330 × 490 × 585 mm  550 × 600 × 530 mm  Dimbilical length  2.5 m  DEFRATING REQUIREMENTS  Water consumption (max 20 °C) 8)  Water consumption (max 20 °C) 8)  Generative humidity  20 - 80 % (non-condensing)  Power requirements 9)  208 or 240 V AC, single phase 50/60 Hz	PUMP LASER <sup>6)</sup>					
Pulse duration  3	Pump wavelength		532 nm			
Beam quality Beam divergence  Co.5 mrad  Coulse energy stability (StdDev)  Coulse repetition rate  Cou	Max pump pulse energy	110 mJ	230 mJ	400 mJ	500 mJ	
Ream divergence    Value energy stability (StdDev)   Value energy stability (Value energy stability (StdDev)   Value energy stability (Value energy stability (Value energy stability (Value energy stability (Value energy e	Pulse duration	4 – 6 ns				
Pulse energy stability (StdDev)  Pulse repetition rate  10 or 20 Hz 7)  10 or 20 Hz 7)  10 or 20 Hz 7)  PHYSICAL CHARACTERISTICS  Unit size (W × L × H)  Power supply size (W × L × H)  330 × 490 × 585 mm  550 × 600 × 530 mm  Umbilical length  2.5 m  DPERATING REQUIREMENTS  Water consumption (max 20 °C) 8)  Relative humidity  20-80 % (non-condensing)  Power requirements 9)  208 or 240 V AC, single phase 50/60 Hz	Beam quality	Hat-Top in near field. Close to Gaussian in far field				
Pulse repetition rate 10 or 20 Hz <sup>7)</sup> 10 or 20 Hz 10 Hz <sup>7)</sup> PHYSICAL CHARACTERISTICS  Unit size (W × L × H) 452 × 610 × 270 mm 452 × 1020 × 270 mm  Power supply size (W × L × H) 330 × 490 × 585 mm 550 × 600 × 530 mm  Umbilical length 2.5 m  PHERATING REQUIREMENTS  Water consumption (max 20 °C) <sup>8)</sup> 6 l/min 10 l/min  Room temperature 15-30 °C  Relative humidity 20-80 % (non-condensing)  Power requirements <sup>9)</sup> 208 or 240 V AC, single phase 50/60 Hz	Beam divergence		<0.5 mrad			
PHYSICAL CHARACTERISTICS  Unit size (W × L × H)	Pulse energy stability (StdDev)		<2.5 %			
Unit size (W × L × H) $452 \times 610 \times 270 \text{ mm}$ $452 \times 1020 \times 270 \text{ mm}$ $330 \times 490 \times 585 \text{ mm}$ $550 \times 600 \times 530 \text{ mm}$ Umbilical length $2.5 \text{ m}$ COPERATING REQUIREMENTS  Water consumption (max 20 °C) ®) $6 \text{ l/min}$ $10 \text$	Pulse repetition rate	10 or 20 Hz <sup>7)</sup>	10 or 20 Hz	10 H	<b>∃</b> z <sup>7)</sup>	
Power supply size (W × L × H)  330 × 490 × 585 mm  550 × 600 × 530 mm  2.5 m   COPERATING REQUIREMENTS  Water consumption (max 20 °C) ® 6 l/min  Room temperature  15–30 °C  Relative humidity  20–80 % (non-condensing)  Power requirements ® 208 or 240 V AC, single phase 50/60 Hz	PHYSICAL CHARACTERISTICS					
District I length 2.5 m  Description (max 20 °C) 8) 6 l/min 10 l/min  Room temperature 15–30 °C  Relative humidity 20–80 % (non-condensing)  Power requirements 9) 208 or 240 V AC, single phase 50/60 Hz	Unit size (W $\times$ L $\times$ H)	452 × 610	452 × 610 × 270 mm		452 × 1020 × 270 mm	
DPERATING REQUIREMENTS  Water consumption (max 20 °C) ®) 6 l/min 10 l/min  Room temperature 15–30 °C  Relative humidity 20–80 % (non-condensing)  Power requirements ®) 208 or 240 V AC, single phase 50/60 Hz	Power supply size (W $\times$ L $\times$ H)	330 × 490	330 × 490 × 585 mm 550 × 600 × 530 mm		× 530 mm	
Water consumption (max 20 °C) ® 6 l/min 10 l/min  Room temperature 15–30 °C  Relative humidity 20–80 % (non-condensing)  Power requirements ® 208 or 240 V AC, single phase 50/60 Hz	Umbilical length		2.5 m			
Room temperature 15–30 °C Relative humidity 20–80 % (non-condensing) Power requirements 9 208 or 240 V AC, single phase 50/60 Hz	OPERATING REQUIREMENTS					
Relative humidity 20–80 % (non-condensing)  Power requirements 9 208 or 240 V AC, single phase 50/60 Hz	Water consumption (max 20 °C) 8)	6 1/1	6 l/min		min min	
Power requirements <sup>9)</sup> 208 or 240 V AC, single phase 50/60 Hz	Room temperature		15-30 °C			
	Relative humidity		20-80 % (nor	n-condensing)		
	Power requirements 9)		208 or 240 V AC, sin	gle phase 50/60 Hz		
	Power consumption 10)	1.8 / 3	.4 kVA	3.4 kVA	5 kVA	

- Due to continuous improvement, all specifications are subject to change without notice. The parameters marked typical are not specifications. They are indications of typical performance and will vary with each unit we manufacture. Unless stated otherwise all specifications are measured at 800 nm.
- <sup>2)</sup> Measured at 800 nm. See tuning curves for typical outputs at other wavelengths.
- FWHM measured with photodiode featuring 500 ps rise time and 600 MHz bandwidth oscilloscope.
- <sup>4)</sup> Beam diameter is measured at 800 nm at the FWHM level and can vary depending on the pump pulse energy.
- <sup>5)</sup> Full angle measured at the FWHM level at 800 nm.

- Separate output port for the 532 nm beam is standard. Output for 1064 nm beam is optional. Pump laser output will be optimised for OPO operation and specification may vary with each unit we manufacture.
- Pulse repetition rates up to 30 Hz are possible. Inquire for pulse energy and other specifications.
- 8) At 10 Hz pulse repetition rate. Air cooled power supply is available as option.
- <sup>9)</sup> Mains voltage should be specified when ordering. 20 and 30 Hz versions of the laser might require three phase mains.
- 10) At 10/20 Hz pulse repetition rate. Required current rating might be calculated by dividing power consumption value by mains voltage value.





OPTIONS

► Fiber-coupled output in 355–2000 nm range. Please contact EKSPLA for details.

#### **PERFORMANCE**

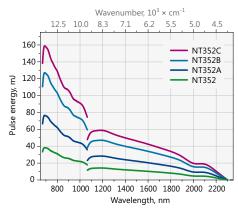


Fig 1. Typical output energy of the NT350 series tunable wavelength systems

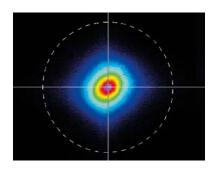


Fig 2. Typical far field beam profile of NT352B laser at 800 nm

#### ORDERING INFORMATION

# NT352A-10-SH-AW-H Model Output pulse energy: none $\rightarrow$ 30 mJ A $\rightarrow$ 60 mJ B $\rightarrow$ 100 mJ C $\rightarrow$ 125 mJ Nodel Options: AW $\rightarrow$ water-air heat exchanger H $\rightarrow$ 1064 nm output Pulse repetition rate, in Hz

