

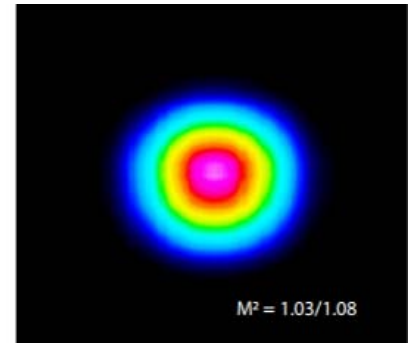
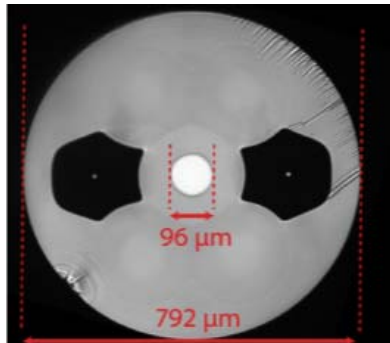
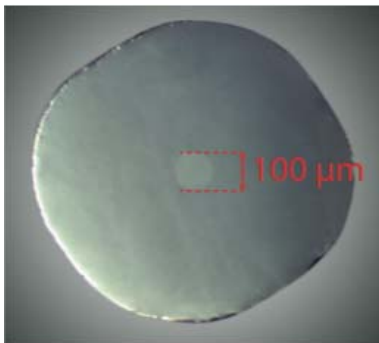
Fiber Amplifiers for Picosecond Ultrashort Pulses

Ultra Large Mode Area Ytterbium Fiber Gain Modules for Picosecond Pulses

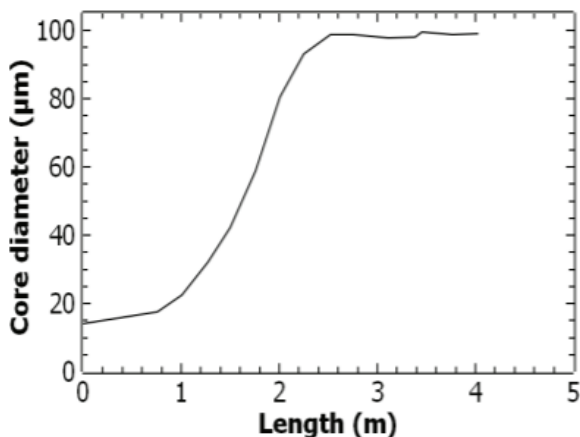
Our ultrafast all-fiber amplifiers and lasers offer a wide range of pulse lengths in >1 picosecond range, pulse energy as high as 300 uJ and optical peak power in megawatt range.

Ultrafast (picosecond and femtosecond) lasers bring new unexplored possibilities in ultrahigh precision and ultrahigh quality processing of hard and fragile (boron carbide, sapphire, ceramics, glass), thermally conductive (diamond) and artificially engineered materials with unique properties (composites including carbon fiber reinforced plastics, metal-carbon plastic assembly) and welding of dissimilar materials. Besides material processing, there is a number of applications in information and communication technologies – LIDARs and optical sensing, THz emission generation, medicine – instrument and implant manufacturing and many others.

Active tapered double clad fiber (T-DC fibers) (Patent protected IP) allows to push performance of all-fiber ultrafast lasers to that of much more expensive solid state lasers and let its customers to benefit from high performance alongside with modest cost, high reliability and life time, and high energy efficiency of all-fiber solution.



We offer fiber gain modules incorporating company's patent protected ultra large mode area ytterbium doped tapered double clad fibers (T-DCF), designed for high power ultrafast amplifiers and lasers. T-DCFs contain largest to date known polarization maintaining ytterbium doped core (100 μm or even more) operated in single mode regime with perfect beam quality ($M^2 < 1.15$).



Key features

- Largest in the world mode field area of 5500 μm²
- Strictly single mode operation with $M^2 < 1.15$
- High gain (30-50 dB)
- High pump absorption (20-30 dB at 976 nm)
- Peak power up to 5 MW
- Low level of nonlinear effects
- Millijoule-level extractable energy
- High threshold of SBS
- Immunity to mode instability

Specifications

Parameters	STGM-A	STGM-B	STGM-C	STGM-D
Description and package	The module includes T-DCF with spliced pump combiner and angle cleaved end face.	The module includes T-DCF with spliced pump combiner and fiber coupled multiplexer	The module includes the full gain model assembled inside a water cooled aluminum case, ships without pump diodes.	The full module including also the pump diodes. Only external water cooling and power supply unit needed.
Wavelength [nm]	1030-1050	1030-1050	1030-1050	1030-1050
Pump wavelength	976 +/- 2	976 +/- 2	976 +/- 2	--
Length [m]	3-4	3-4	--	--
Core NA	0.11	0.11	--	--
Cladding NA	0.4	0.4	--	--
Input signal fiber	HI1060 or similar. Upon request – custom fiber with core diameter up to 15um and NA<0.11	HI1060 or similar. Upon request – custom fiber with core diameter up to 15um and NA<0.11	--	HI1060 or similar. Upon request – custom fiber with core diameter up to 15um and NA<0.11
Power of seed source [mW]	>0.5	>0.5	>0.5	--
Pump Fiber	105/125um, NA0.22 or 0.15	105/125um, NA0.22 or 0.15	105/125um, NA0.22 or 0.15	--
Pump power (narrow end, pump combiner) [W]	2 x 25	2 x 25	--	--
Pump power (wide end, free-space) [W]	200	200	--	--
Pump power input 1[W]	--	--	2 x 25W	--
Pump power input 2[W]	--	--	2 x 25W or 4 x 50W	--
Output power [W]	--	--	--	Up to 40W
Polarization	Random	Random	Random	--
M2	<1.2	<1.2	<1.2	<1.2
Min coiling diameter [cm]	37.5	37.5	--	--
Package	none	none	aluminium housing	aluminium housing
Recommended water flow [L/min]	--	5	5	5

Specifications for polarisation maintaining versions

Parameters	STGM-A-PM	STGM-B-PM	STGM-C-PM	STGM-D-PM
Description and package	The module includes polarization-maintaining T-DCF with spliced pump combiner and angle cleaved end face.	The module includes polarization maintaining T-DCF with spliced pump combiner and fiber coupled multiplexer.	The module includes the full polarization maintaining gain model assembled inside a water cooled aluminum case, ships without pump diodes.	The full polarization-maintaining module including also the pump diodes. Only external water cooling and power supply unit needed.
Wavelength [nm]	1030-1040	1030-1050	1030-1040	1030-1040
Pump wavelength [nm]	976 +/- 2	976 +/- 2	976 +/- 2	976 +/- 2
Mode field Diameter [um]	88	88	88	88
Polarisation extinction ratio (PER) [dB]	>16	>16	>16	>16
M2	<1.15	<1.15	<1.15	<1.15
Ellipticity	>0.92	>0.92	>0.92	>0.92
Core NA	0.11	0.11	0.11	--
Cladding NA	0.4	0.4	0.4	--
Input signal fiber	PM 6/125 DCF or PM10/125 DCF	PM 6/125 DCF or PM10/125 DCF	PM 6/125 DCF or PM10/125 DCF	PM 6/125 DCF or PM10/125 DCF
Pump fiber, narrow end	2 fibers 105/125 NA0.22, 25W each	2 fibers 105/125 NA0.22, 25W each	2 fibers 105/125 NA0.22, 25W each	--
Pump fiber, wide end	--	-1 fiber 200/220 NA 0.22 100 W or -1 fiber 105/125 NA 0.22 100 W or -4 fibers 105/125 NA 0.15 50 W each	-1 fiber 200/220 NA 0.22 100 W or -1 fiber 105/125 NA 0.22 100 W or -4 fibers 105/125 NA 0.15 50 W each	--
Output power	>40W @ 30mW input, fully pumped from both sides	>40W @ 30mW input, fully pumped from both sides	>40W @ 30mW input, fully pumped from both sides	>40W @ 30mW input, fully pumped from both sides
Power of seed source [mW]	>0.5	>0.5	>0.5	>0.5
Back reflected power [W]	<1	<1	<1	<1
Recommended water flow [L/min]	5 @ 20degC	5 @ 20degC	5 @ 20degC	5 @ 20degC
Pump power [W]	<25	<25	<25	--
Pump power (wide end, freespace) [W]	<100	<100	<100	--
Min. coiling diameter [cm]	37.5	37.5	37.5	--
Package	none	none	aluminium housing	aluminium housing

Ordering: STGM- configuration-type - PM - wavelength - input fiber

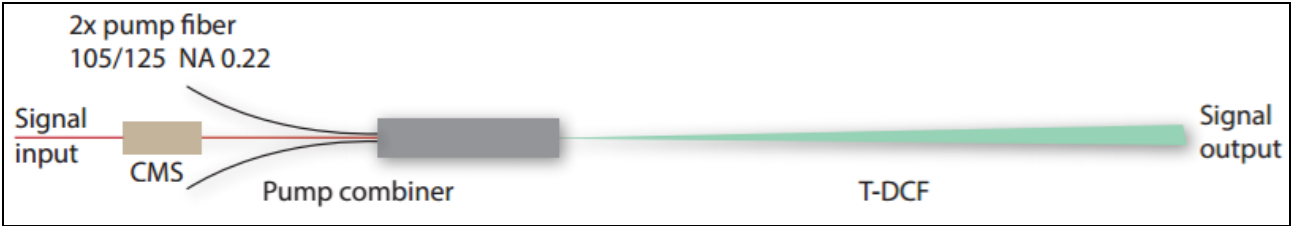
Example: STGM- A - PM - 1035 - 6/125 DCF

Example: STGM- C - PM - 1035 - 6/125 DCF - 1x200/220

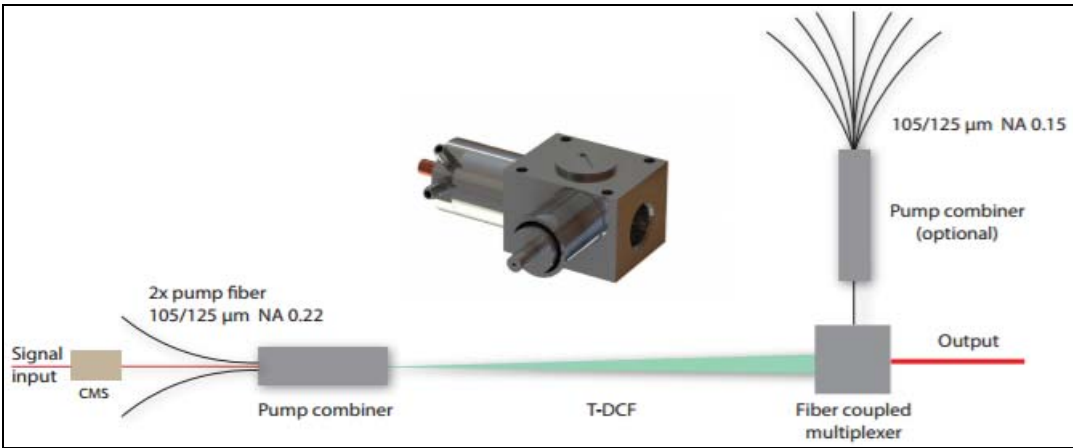
Example: STGM- C - PM - 1035 - 10/125 DCF - 4x105/125

Configurations (A, B, C, D):

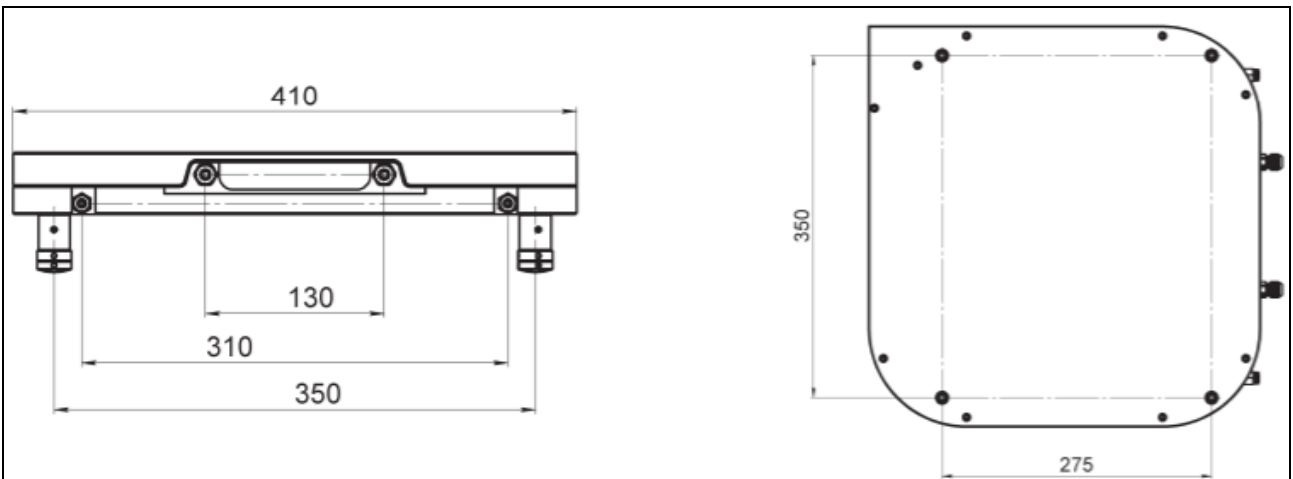
TG Module A or TG Module A-PM

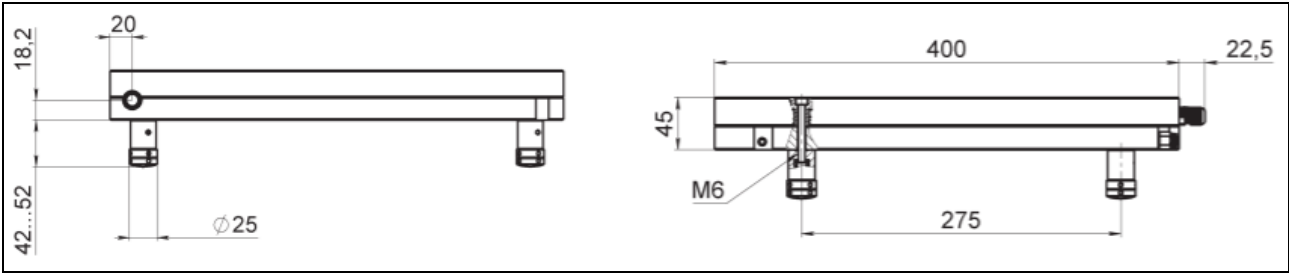


TG Module B or TG Module B-PM

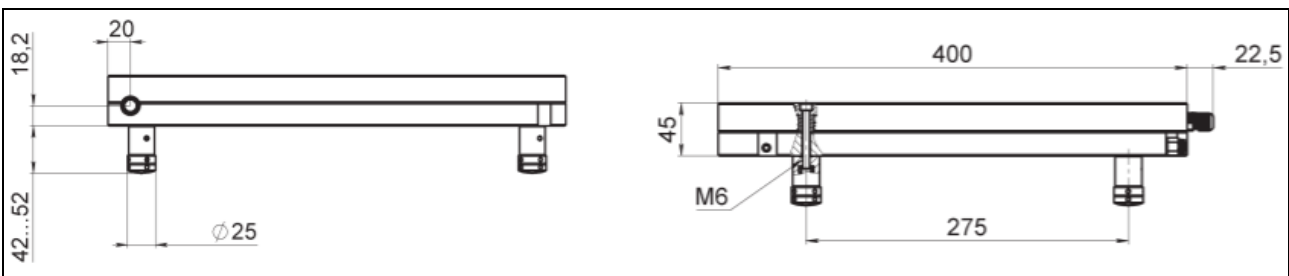
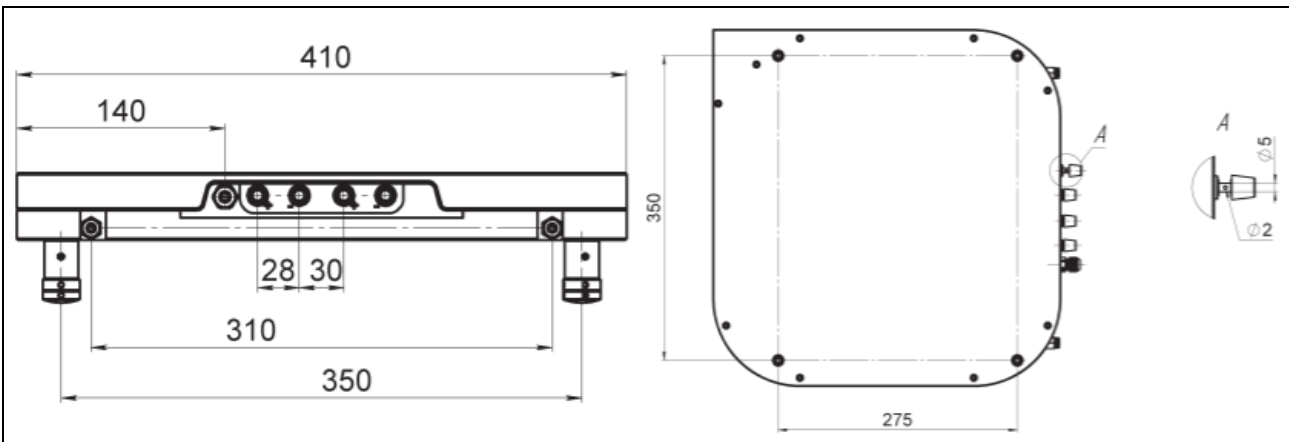
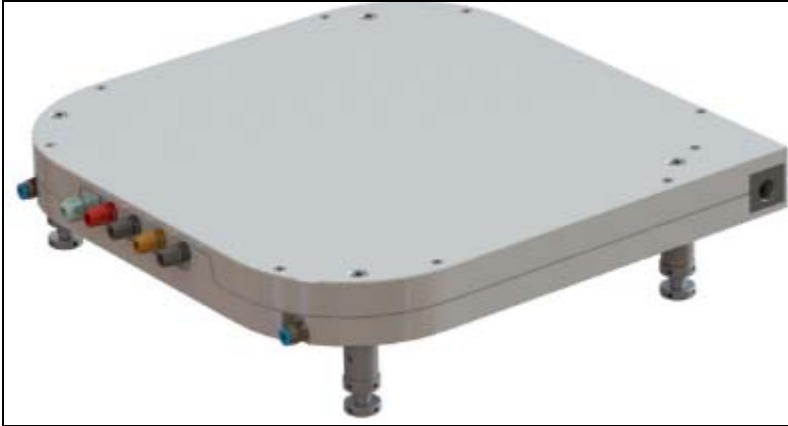


TGModule C or TGModule C-PM





TG Module D or TG Module D-PM



Examples:

Test condition: 21 MHz, 25 ps, 30 mW 1035 nm pulsed input signal

Output average power: 40 W

Beam quality M^2 : 1.08

Amplification: 31 dB

