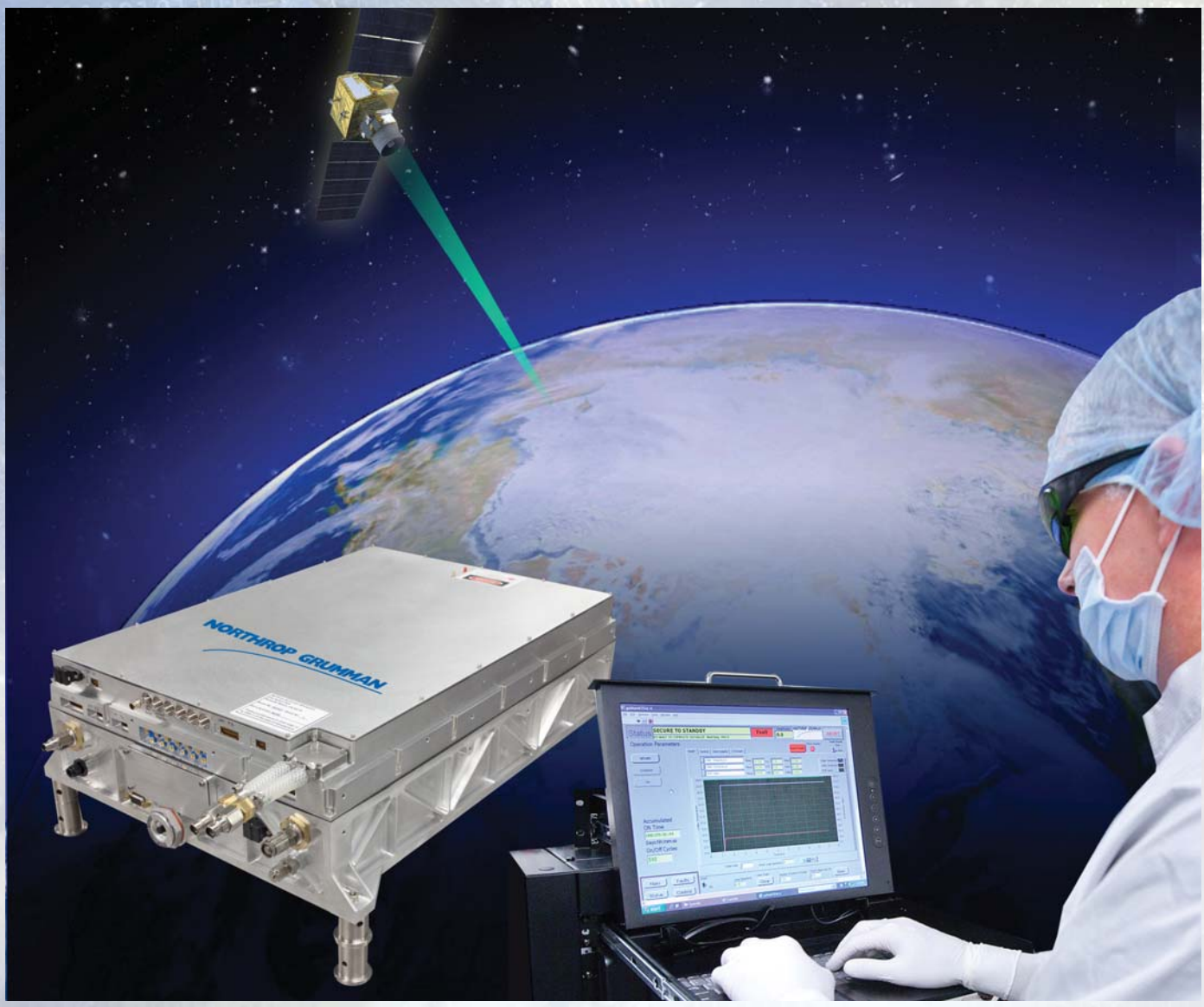
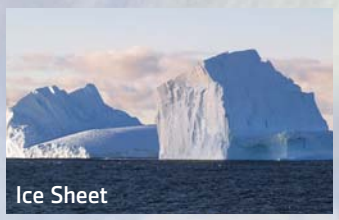
NORTHROP GRUMMAN

M-Pulse

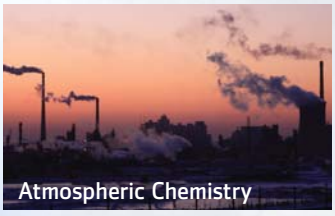
High-efficiency fiber laser for LIDAR sensors




Ice Sheet


3-D Structures


Biomass


Atmospheric Chemistry

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High-efficiency fiber laser for LIDAR sensors

Northrop Grumman now adds to its laser product line M-Pulse – a compact, scalable fiber laser developed for space-based Light Detection and Ranging (LIDAR) instruments.

With its high-frequency pulse repetition rates (multi-kilohertz) and power levels up to 300 watts, this fiber laser technology is flexible enough to apply to a broad range of missions, including ice or terrain elevation mapping, biomass measurement, structural characterization, and atmospheric composition and ozone measurements.

M-Pulse's superior power efficiency, which surpasses that of previous-generation diode-pumped, bulk solid-state lasers, enables LIDAR instruments to be designed with lower power consumption, higher reliability, and in a more compact size than previously available.

The net result of these power and efficiency advantages is lower mission cost.

Although designed and tested for the environmental, performance and reliability requirements of space, the M-Pulse technology offers similar benefits for airborne LIDAR instruments as well.

Utility of LIDAR sensors

LIDAR sensors enable scientists and other users to obtain very high accuracy, three-dimensional topographic data in daytime or nighttime. This remote sensing data can be used for such purposes as precise terrain/elevation mapping, 3D imaging of physical structures, and measurement of forest biomass for carbon monitoring.

At alternate wavelengths, LIDAR sensors can be used to measure chemical properties of the atmosphere, measuring levels of carbon or a variety of other pollutants.

LIDAR instruments may be designed to repetitively produce and measure single pulses of light from the laser and assimilate the pulse readings into images. Alternatively, a 3D Flash LIDAR design uses a pixel array and a larger light beam to generate flashes of 3D images. This 3D Flash LIDAR approach generally requires a higher power laser, which is an advantage of the M-Pulse laser.

Advantage of scalability

The M-Pulse fiber laser design is easily scalable to a range of power levels.

The current M-Pulse product family consists of configurations at three power levels: 20, 150, and 300 Watts. These power levels are produced with a pulse width of less than 2 ns, and a pulse repetition rate of 10 KHz for the M-Pulse 20 version, and 20 KHz for the M-Pulse 150 and 300 versions.

Additional flexibility is offered by the ability to split the M-Pulse laser output to allow for multi-beam LIDAR configurations.

Product Specifications

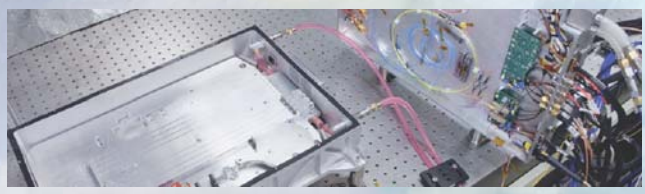
	M-Pulse 20	M-Pulse 150	M-Pulse 300
Wavelength	1.064 µm	1.064 µm	1.064 µm
Pulse Rate*	10 KHz	20 KHz	20 KHz
Pulse Width	< 2 ns	< 2 ns	< 2 ns
Beam Quality	<1.2x diffraction	<1.2x diffraction	<1.2x diffraction
Output Power			
Pulse energy	2 mJ	7.5 mJ	15 mJ
Average power	20W @ 10 KHz	150W @ 20 KHz	300W @ 20 KHz
Bus-Plug Efficiency	> 13%	> 25%	> 25%
Mass	20 Kg	36 Kg	72 Kg
Volume (Dimensions)	30 x 50 x 15 cm	36 x 48 x 18 cm	Two M-Pulse 150 Units

** Pulse rate is scalable from 5 KHz up to 1 MHz*

Mature technology

Northrop Grumman, with its decades-long history of cutting-edge laser technology development, has been developing fiber laser technology since 2005. This laser design expertise has led to the high-performance, high-quality design of the M-Pulse laser that features the efficiency and power needed in a compact size.

Design components and packaging have been validated for space environment operation through radiation, vacuum and life testing.



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