Talon®

Disruptive Cost-Performance UV and Green Nanosecond Lasers

mks | Spectra-Physics®

Talon is an exciting family of UV and green diode-pumped solid state (DPSS) Q-switched lasers that delivers an unprecedented combination of performance, reliability, and cost. With models from 6 to now >45 W UV power, the Talon product family is ideal for a remarkable range of processes and applications with a common optical, electrical, and command interface for easy interchangeability. Based on Spectra-Physics' *It's in the Box*™ design, with the laser and controller combined in a single, compact package, all Talon lasers use field-proven technology to output up to >45 W or >500 µJ per pulse of UV, and in green models up to >70 W or 1000 µJ, with a wide repetition rate range of 0 to 500 kHz for UV and 0 to 700 kHz for green, high pulse-to-pulse stability and excellent TEM_{00} mode quality for tens of thousands of operating hours.

Talon is a rugged industrial laser capable of supplying the long-term performance and low cost of ownership necessary for a 24/7 precision manufacturing tool.

Talon lasers are ideal for a wide range of micromachining applications where extended production cycles rely on stable beam quality and high uptime. Features such as E-Pulse™, which holds pulse energy and pulse width constant over wide repetition rate ranges, ensure superb process control. For fast processing speeds, its performance at high repetition rates is ideal.

Talon is a flexible platform that allows matching the right laser to the process requirements and budget. The same features, characteristics and benefits are available in models producing from 6 to now 45 W of UV and 15 to 70 W of green output. Where short pulse widths are preferred, Talon excels with its high peak power and short pulse widths. Should higher pulse energies and longer pulse widths be desired, the Talon HE models provide 3 to 6 times the pulse width with high pulse energies.

The Talon Advantage

- Superior combination of performance, reliability, and cost
- 12 interchangeable models with common optical, electrical, and command interfaces for wide breadth of process coverage
- Rugged industrial platform
- Outstanding beam parameters, performance, and stability
- ALPS (Active Laser Purification System) for sustained performance to ensure long laser lifetime
- Long-life diodes and minimal interventions over the life of the laser
- Easy-to-integrate compact laser head includes the diodes and control electronics, with simple utility hookups

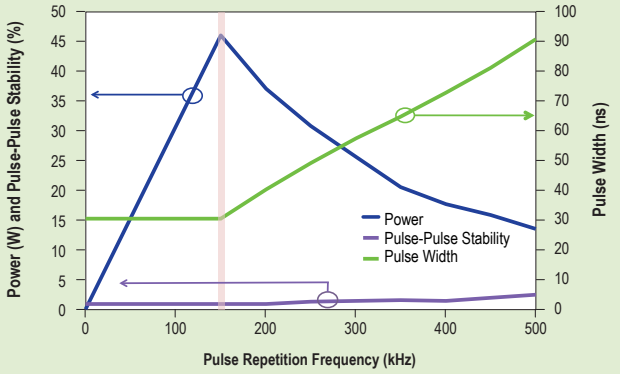
Applications

- PCB de-paneling, cutting, and drilling
- Solar cell processing
- Silicon scribing
- Ceramic scribing, cutting, and drilling
- ITO patterning
- Glass cutting and drilling
- Metal foil cutting

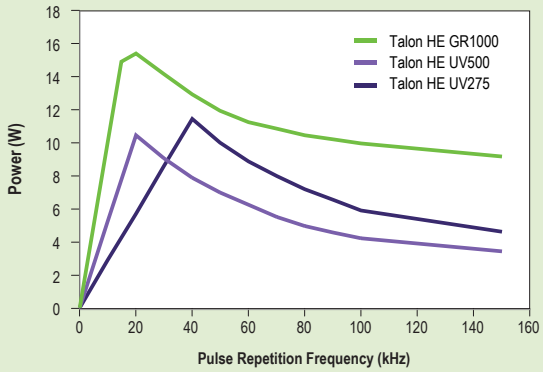
It's in the Box™

Each of the Talon models feature the same interfaces, similar footprints, and remarkable ease of use, making scaling existing processes or bringing up a new one straightforward and convenient. All Talon's are bore-sighted, making replacement, if ever needed, simple and convenient. The laser can be remotely controlled via RS 232 or USB interface, and incorporates extensive on-board data logging of key parameters. Mode quality remains stable over the operating range, up to 500 kHz for UV and up to 700 kHz for green. The long-life diodes, innovative optical and electronics design, and Spectra-Physics' extensive experience in producing UV lasers for 24/7 applications make Talon a highly reliable laser for demanding applications.

Talon UV45: Typical Power, Pulse Width and Pulse Stability[1]

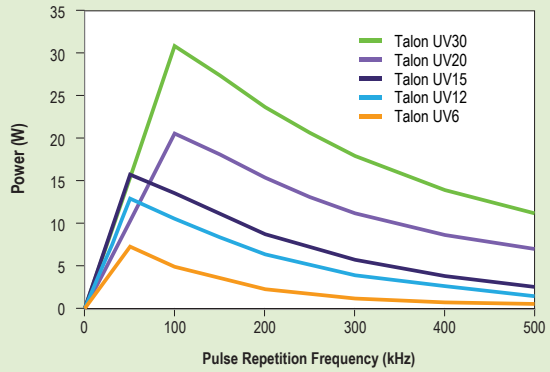


Talon HE Models: Typical Power[1]

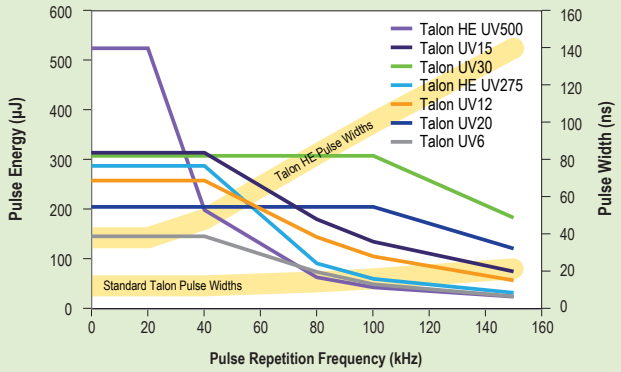


1. Typically measured performance; not a guaranteed or warranted specification.

Talon UV 6-30 W Models: Typical Power[1]

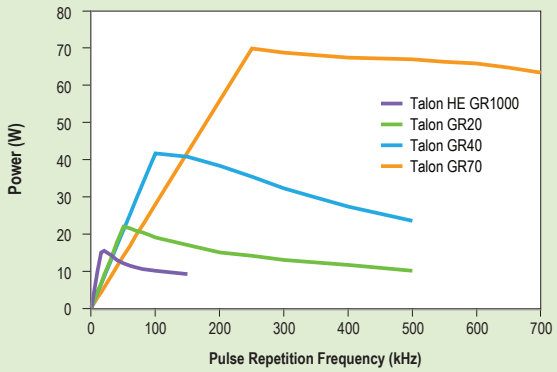


Talon UV Models: Typical Pulse Energy and Pulse Width[1]

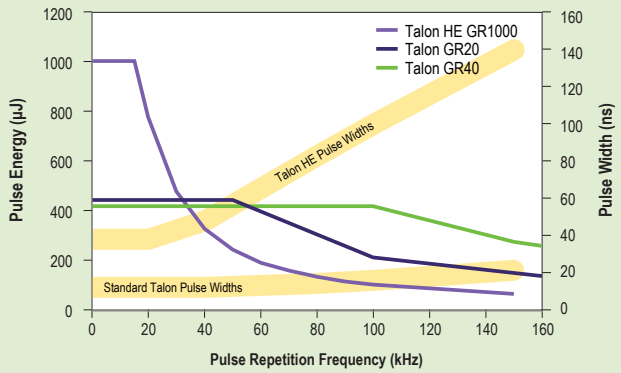


1. Typically measured performance; not a guaranteed or warranted specification.

Talon Green Models: Typical Power[1]



Talon Green Models: Typical Pulse Energy and Pulse Width[1]



1. Typically measured performance; not a guaranteed or warranted specification.

Talon Specifications[1, 2, 6]

	Talon UV45	Talon UV30	Talon UV20	Talon UV15	Talon UV12	Talon UV6
Output Characteristics						
Wavelength	355 nm	355 nm	355 nm	355 nm	355 nm	355 nm
Power[2]	>30 W @ 100 kHz	>15 W @ 50 kHz	**>10 @ 50 kHz**	**>15 W @ 50 kHz**	**>12 W @ 50 kHz**	**>6 W @ 50 kHz**
	>45 W @ 150 kHz >35 W @ 200 kHz	**>30 W @ 100 kHz** >23 W @ 200 kHz	**>20 W @ 100 kHz**	**>13 W @ 100 kHz**	**>10 W @ 100 kHz**	>4 W @ 100 kHz
	>23 W @ 300 kHz	>17 W @ 300 kHz	>11 W @ 300 kHz	>3 W @ 300 kHz	>3 W @ 300 kHz	>1 W @ 300 kHz
Repetition Rate	0 to 500 kHz					
Pulse Width	<35 nsec @ 150 kHz	< 25 nsec @ 100 kHz				
Pulse-to-Pulse Energy Stability	<2% rms @ 150 kHz	<2% rms @ 100 kHz, typical				<2% rms @ 50 kHz, typical
	<3% rms up to 300 kHz					<3% rms up to 150 kHz
	<5% rms above 300 kHz					<5% rms up to 300 kHz, typical
Beam Characteristics[3]						
Spatial Mode	TEM_{00}					
M^2	<1.2					
Polarization Ratio	100:1 vertical					
Beam Diameter, at waist	3.5 mm ±10%			1.0 mm ±10%[5]	1.0 mm ±10%	
Beam Divergence (full angle)	<0.3 mrad			<0.6 mrad		
Beam Asymmetry (circularity)	<1.1 (>90%)					
Boresighting Tolerance	<1 mm, <1 mrad					
Beam Pointing Stability[4]	< ±25 µrad/°C		< ±10 µrad/°C			
Operating Conditions / Environmental Range						
AC Input	110/220 ±10% VAC, 50-60 Hz					
Warm-up Time	<20 min from standby; <40 min from cold start					
Temperature Range	18 to 35°C operating; -20 to 50°C non-operating					
Altitude	0–3,000 m operating; 0–12,000 m non-operating					
Humidity	8–95%, non-condensing					
Cooling Water Temperature	20°C ±1°C, stable to ±0.2°C					
Cooling Water Flow	3.5–6.0 liter/minute, 40 psi typical	1.5 liter/minute minimum, 20 psi typical				
Thermal Load (to water)	<800 Watts	<350 Watts		<300 Watts		
Total Power Consumption	<900 Watts	<400 Watts		<300 Watts		
Physical Characteristics						
Dimensions (Laser) (L x W x H)	28 x 9 x 5 in (711x 229 x 127 mm)	25 x 6 x 4.5 in (635 x 153 x 115 mm)				
Weight (Laser)	45 lbs. (20.5 kg)	28 lbs (12.7 kg)				
Dimensions (Utility Module) (L x W x H)	19.6 x 19 x 3.5 in (498 x 482 x 88 mm)					
Weight (Utility Module)	22 lbs (10 kg)					
Features						
Optional Safety Shutter	Externally mounted for easy field service and customer replaceable					
Internal Power Monitor	May be calibrated against an external power meter					
E-Pulse Pulse Energy Control	Keeps pulse energy, pulse width and beam parameters held constant over a wide range of repetition rates					
Data Log	Long-term and short-term recording for diagnostics and equipment maintenance					
CW Alignment Beam Mode	Lower power CW UV beam for installation and alignment in a tool					
Sacrificial Window	Customer replaceable to maintain power in harsh environments					
ALPS (Active Laser Purification System)	Maintains internal optics cleanliness for long term, reliable operation					
Precision Position Registration	Hardened steel receptacles for indexing pins for repeatable, precision alignment from unit to unit					

1. Due to our continuous product improvement, all specifications are subject to change without notice.
2. Power specification and warranty applies to **Boldface power** specs only. Other values are typical.
3. All beam parameter specifications are at 100 kHz, except for 150 kHz for UV45 and 500 kHz for GR70.
4. Pointing stability applies after 2 hour warm-up.
5. Talon UV15 is available with a 3.5 mm beam diameter upon request.
6. **The Talon is a Class IV – High Power Laser, whose beam is, by definition, a safety and fire hazard. Take precautions to prevent exposure to the direct and reflected beams. Diffuse as well as specular reflections can cause severe skin or eye damage.**

Talon Specifications[1, 2, 6]

	Talon GR20	Talon GR40	Talon GR70
Output Characteristics			
Wavelength	532 nm	532 nm	532 nm
Power[2]	**>20 W @ 50 kHz**	>20 W @ 50 kHz	**> 70 W @ 275 kHz**
	>18 W @ 100 kHz	**>40 W @ 100 kHz** >36 W @ 200 kHz	
	>13 W @ 300 kHz	>30 W @ 300 kHz	
Repetition Rate	0 to 500 kHz		0 to 700 kHz
Pulse Width	<25 nsec @ 100 kHz		<43 nsec @ 550 kHz
Pulse-to-Pulse Energy Stability	<2% rms @ 100 kHz, typical		<3% rms up to 550 kHz
	<3% rms up to 300 kHz		
	<5% rms above 300 kHz		
Beam Characteristics[3]			
Spatial Mode	TEM_{00}		
M^2	<1.2		
Polarization Ratio	100:1 vertical		
Beam Diameter, at waist	1.0 mm ±10%		2.0 mm ±10%
Beam Divergence (full angle)	<0.9 mrad		<0.6 mrad
Beam Asymmetry (circularity)	<1.1 (>90%)		
Boresighting Tolerance	< 1 mm, < 1 mrad		
Beam Pointing Stability[4]	< ±10 µrad/°C	< ±25 µrad/°C	
Operating Conditions / Environmental Range			
AC Input	110/220 ±10% VAC, 50-60 Hz		
Warm-up Time	<20 minutes from standby; <40 minutes from cold start		
Temperature Range	18-35°C operating -20 to 50°C non-operating		
Altitude	0-3,000 m operating 0-12,000m non-operating		
Humidity	8-95%, non-condensing		
Cooling Water Temperature	20°C ±1°C, stable to ±0.2°C		
Cooling Water Flow	1.5 liter/minute minimum, 20 psi typical		3.5-6.0 liter/minute, 40 psi typical
Thermal Load (to water)	<300 Watts	<350 Watts	<800 Watts
Total Power Consumption	<300 Watts	<400 Watts	<900 Watts
Physical Characteristics			
Dimensions (Laser) (L x W x H)	25 x 6 x 4.5 in. (635 x 153 x 115 mm)		28 x 9 x 5 in. (711 x 229 x 127 mm)
Weight (Laser)	28 lbs. (12.7 kg)		45 lbs. (20.5 kg)
Dimensions (Utility Module) (L x W x H)	19.6 x 19 x 3.5 in. (498 x 482 x 88 mm)		NA
Weight (Utility Module)	22 lbs. (10 kg)		NA
Features			
Optional Safety Shutter	Externally mounted for easy field service and customer replaceable		
Internal Power Monitor	May be calibrated against an external power meter		
E-Pulse Pulse Energy Control	N/A		
Data Log	Long-term and short-term recording for diagnostics and equipment maintenance		
CW Alignment Beam Mode	N/A		
Sacrificial Window	Customer replaceable to maintain power in harsh environments		
ALPS (Active Laser Purification System)	Maintains internal optics cleanliness for long term, reliable operation		N/A
Precision Position Registration	Hardened steel receptacles for indexing pins for repeatable, precision alignment from unit to unit. All models have same position relative to beam location		

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4. Pointing stability applies after 2 hour warm-up.
5. Talon UV15 is available with a 3.5 mm beam diameter upon request.
6. **The Talon is a Class IV – High Power Laser, whose beam is, by definition, a safety and fire hazard. Take precautions to prevent exposure to the direct and reflected beams. Diffuse as well as specular reflections can cause severe skin or eye damage.**

Talon HE Specifications[1, 2, 5]

		Talon HE UV500	Talon HE UV275	Talon HE GR1000
Output Characteristics				
Wavelength		355 nm	355 nm	532 nm
Pulse Energy[2, 3]	15 kHz	500 µJ typical	275 µJ typical	1000 µJ typical
	20 kHz	>500 µJ	275 µJ typical	>750 µJ
	40 kHz	192 µJ typical	>275 µJ	325 µJ typical
	100 kHz	42 µJ typical	59 µJ typical	100 µJ typical
Power[2, 3]	15 kHz	—	—	15 W typical
	20 kHz	>10 W	5.7 W typical	>15 W
	40 kHz	7.7 W typical	>11 W	13 W typical
	100 kHz	4.2 W typical	5.9 W typical	10 W typical
Frequency[2, 3]		20 kHz	40 kHz	20 kHz
Repetition Rate		0 to 150 kHz		
Pulse Width		25–40 nsec @ 20 kHz	40–60 nsec @ 40 kHz	25–40 nsec @ 20 kHz
Pulse-to-Pulse Energy Stability		<3% rms		
Beam Characteristics				
Spatial Mode		TEM_{00}		
M^2		<1.2		
Polarization Ratio		100:1 vertical		
Beam Diameter, at waist		3.5 mm ±10%		1.0 mm ±10%
Beam Divergence (full angle)		<0.3 mrad		<0.9 mrad
Beam Asymmetry (circularity)		<1.1 (>90%)		
Boresighting Tolerance		<1 mm, <1 mrad		
Beam Pointing Stability[4]		< ±10 µrad/°C		
Operating Conditions / Environmental Range				
AC Input		110/220 ±10% VAC, 50-60 Hz		
Warm-up Time		<20 min from standby; <40 min from cold start		
Temperature Range		18 to 35°C operating; -20 to 50°C non-operating		
Altitude		0–2,000 m operating; 0–12,000 m non-operating		
Humidity		8–95%, non-condensing		
Water Cooling Requirements		20°C ±1°C, stable to ±0.2°C, 1.5 liter/minute minimum, 20 psi		
Thermal Load (to water)		<350 W		
Total Power Consumption		<400 W		
Physical Characteristics				
Dimensions (Laser) (L x W x H)		25 x 6 x 4.5 in (635 x 153 x 115 mm)		
Weight (Laser)		28 lbs (12.7 kg)		
Dimensions (Utility Module) (x W x H)		19.6 x 19 x 3.5 in (498 x 482 x 88 mm)		
Weight (Utility Module)		22 lbs (10 kg)		
Features				
Optional Safety Shutter		Externally mounted for easy field service and customer replaceable		
Internal Power Monitor		May be calibrated against an external power meter		
E-Pulse Pulse Energy Control		Keeps pulse energy, pulse width and beam parameters held constant over a wide range of repetition rates		
Data Log		Long-term and short-term recording for diagnostics and equipment maintenance		
CW Alignment Beam Mode		Lower power CW UV beam for installation and alignment in a tool		
Sacrificial Window		Customer replaceable to maintain power in harsh environments		
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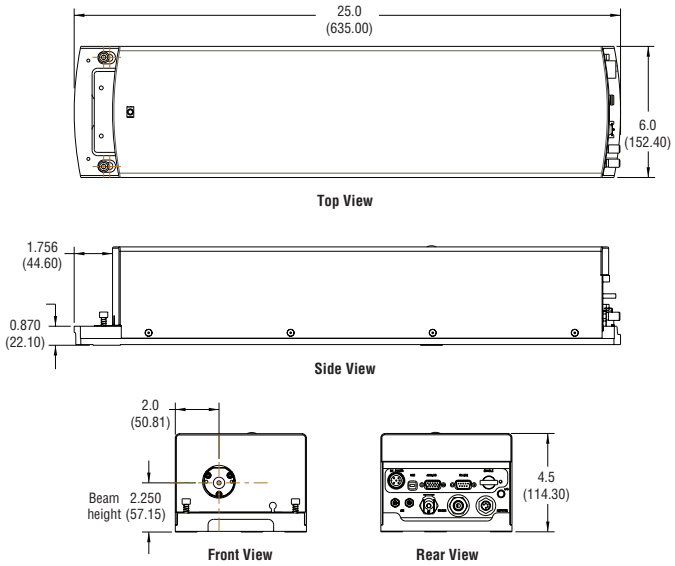
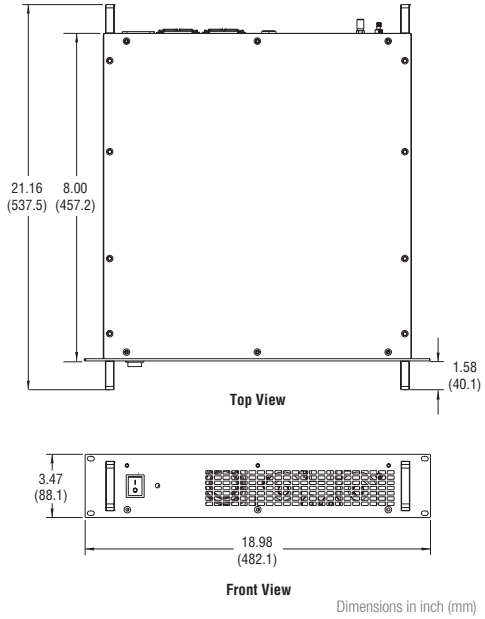
Talon Dimensional Drawings



Dimensions in inch (mm)

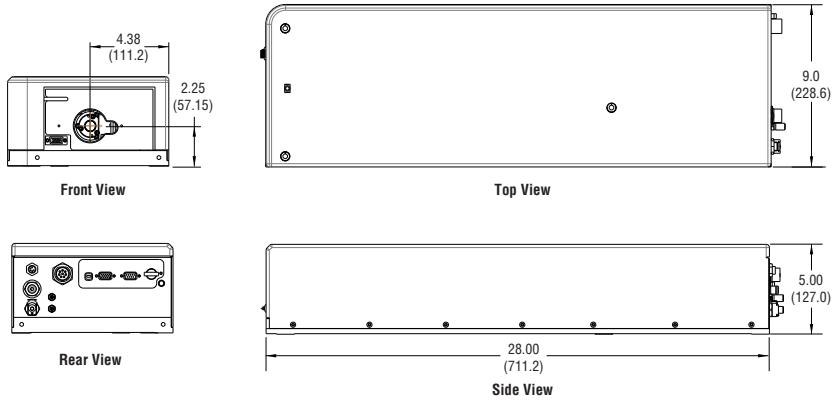
Talon Laser Dimensions[1]

1. Except Talon UV45 and GR70



Dimensions in inch (mm)

Utility Module Dimensions



Dimensions in inch (mm)

Talon UV45 and GR70 Laser Dimensions

www.spectra-physics.com

1565 Barber Lane, Milpitas, CA 95035 USA
PHONE: 1-800-775-5273 1-408-980-4300 FAX: 1-408-980-6921 EMAIL: sales@spectra-physics.com

Belgium	+32-(0)0800-11 257	Belgium@newport.com	Korea	+82-31-8021-1600	korea@spectra-physics.com
China	+86 510 8113 2999	spectra-physics-china@mksinst.com	Netherlands	+31-(0)30 6592111	netherlands@newport.com
France	+33-(0)1-60-91-68-68	france@newport.com	Singapore	+65-6664-0040	sales.sg@newport.com
Germany / Austria / Switzerland	+49-(0)6151-708-0	germany@newport.com	Taiwan	+886-3-575-3040	sales@newport.com.tw
Japan	+81-3-3556-2705	spectra-physics.jp@mksinst.com	United Kingdom	+44-1235-432-710	uk@newport.com

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