AMADA MIYACHI AMERICA, INC.

A-Series Power Curves

Introduction

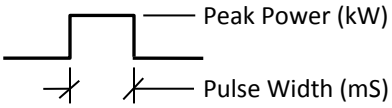
This document defines the expected output power ratings for each of the A-Series Laser Welders. Limitations within the design prevent the Laser from producing the maximum rated power for all combinations of pulse width, peak power and repetition rates. The factors that affect available power include;

- the available energy stored in the discharge capacitors,
- the ability to charge the capacitors quick enough at high repetition rates,
- the sample rate of the Laser electronics,
- the condition of the Flashlamp (directly proportional to the Lamp Input Power).

Calculating Pulse Energy and Output Power

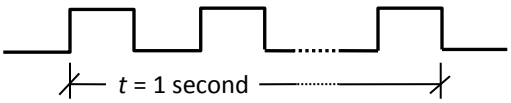
The theoretical Pulse Energy and Output Power can be calculated as follows:

Pulse Energy



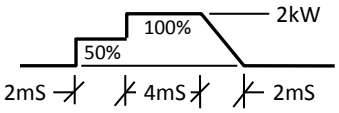
Pulse Energy (J) = Peak Power (kW) × Pulse Width (mS)

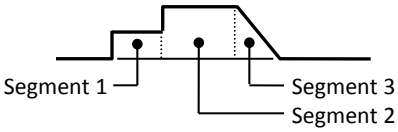
Output Power (calculated over 1 second)



Output Power (W) = Pulse Energy (J) × Repetition Rate (pps)

Example: What is the Pulse Energy and Output Power for the following programmed pulse at 10pps.





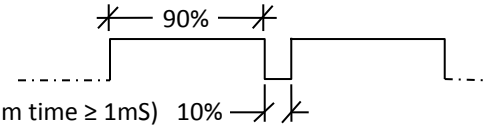
Pulse Energy	=	Energy (Segment 1) + Energy (Segment 2) + Energy (Segment 3)
	=	[(2kW × 50%) × 2mS] + [(2kW × 100%) × 4mS] + [½(2kW x 100%) × 2mS]
	=	2J + 8J + 2J = **12J per pulse**
Output Power	=	Pulse Energy (J) × Repetition Rate (pps) = 12J × 10pps = **120W output power**

Parameter Definitions:

Average Power	: Average maximum output power available for the Laser
Peak Power	: Maximum Peak Power at the specified pulse width (rated in kW)
Pulse Energy	: Maximum Pulse Energy available at the specified pulse width (rated in Joules)
Max Rep Rate	: The maximum # of pulses/second the Laser is capable of producing (rated in pps)
Pulse Width Range	: The programmable range of an output pulse (rated in milli-seconds)
Pulse Width Resolution	: The smallest programmable resolution of the programmable pulse width
PWM Frequency	: The sample rate of the Laser. The higher the number, the more stable the output
Maximum Duty Cycle	: The maximum ratio of Laser output ON to Laser output OFF

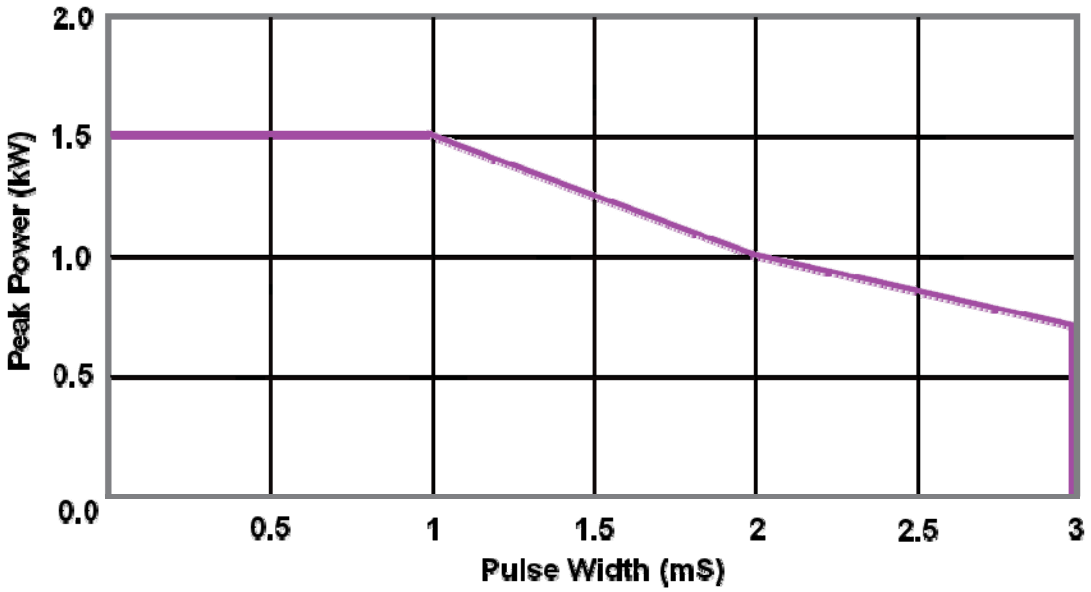
Example: if the maximum duty cycle is 90%, the Laser can produce:

$$\text{Duty Cycle} = \frac{\text{on}}{\text{on + off}}$$



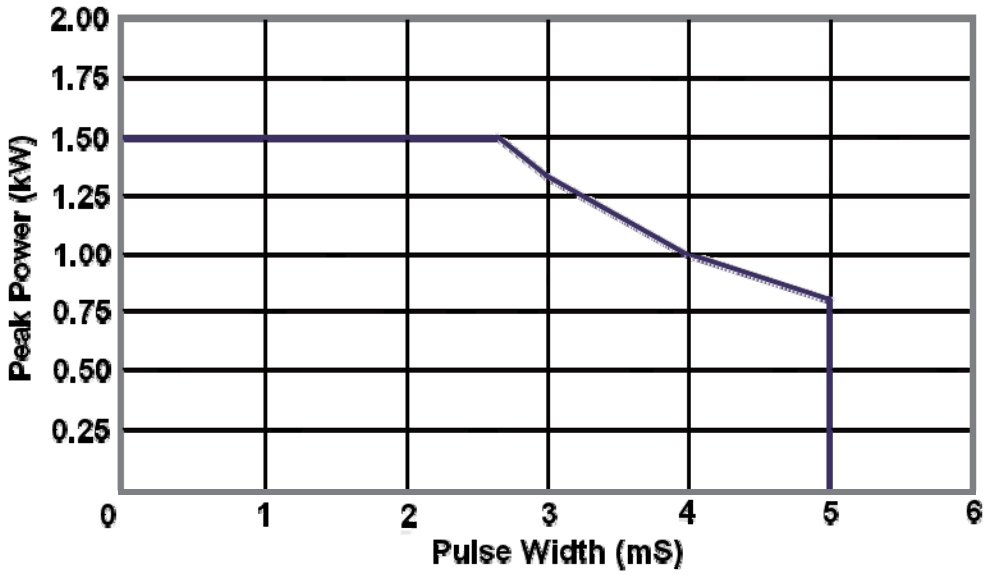
LW2AG / ML-8050A **532nm** **Note: Obsolete Model**

Average Power	2W	Pulse Width Range	0.2mS to 3mS
Peak Power	1.5kW @ 1mS	Pulse Width Resolution	0.02mS
Pulse Energy	2J @ 1mS	Maximum Duty Cycle	3.6%
Max Rep Rate	12Hz	PWM Frequency	50kHz



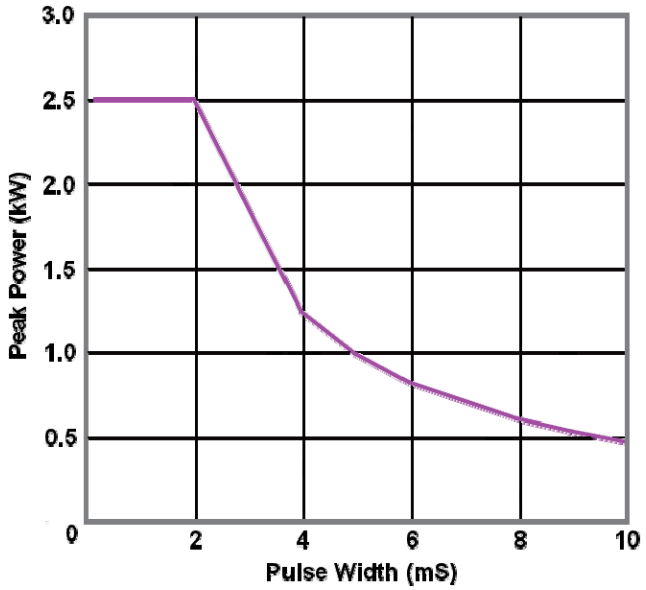
LW5AG / ML-8150A **532nm**

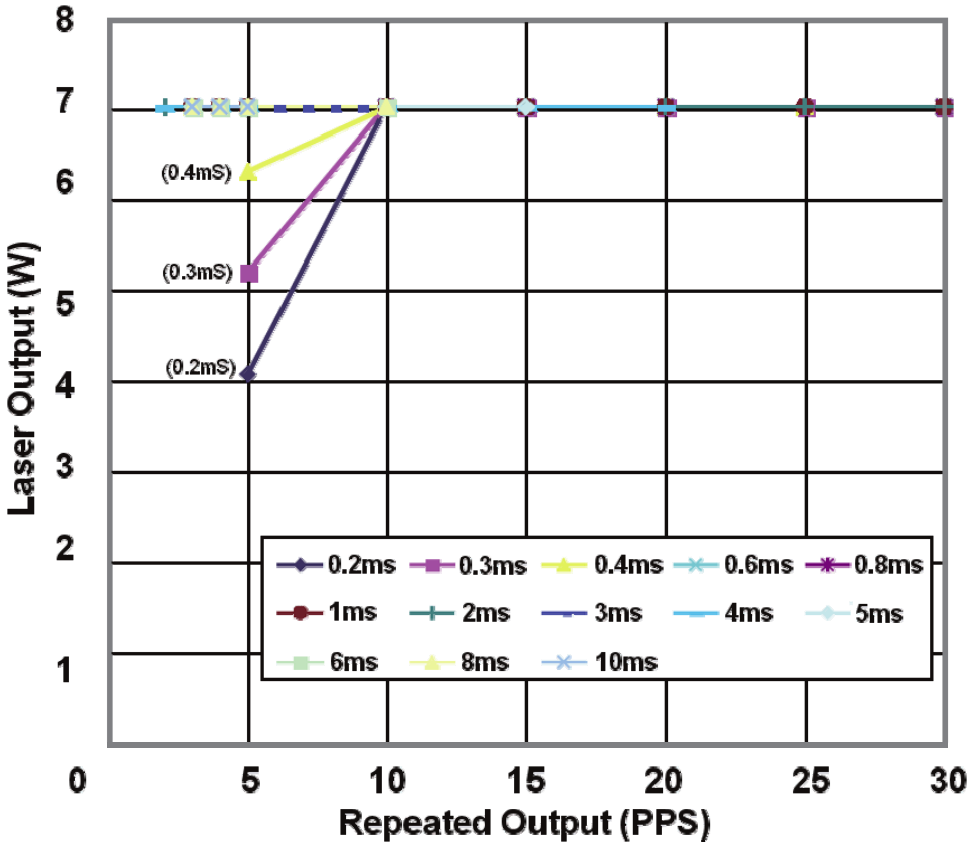
Average Power	5W	Pulse Width Range	0.2mS to 5mS
Peak Power	1.5kW @ 2.67mS	Pulse Width Resolution	0.02mS
Pulse Energy	4J @ 2.67mS	Maximum Duty Cycle	15%
Max Rep Rate	30Hz	PWM Frequency	50kHz



LW5A / ML-2051A **1064nm**

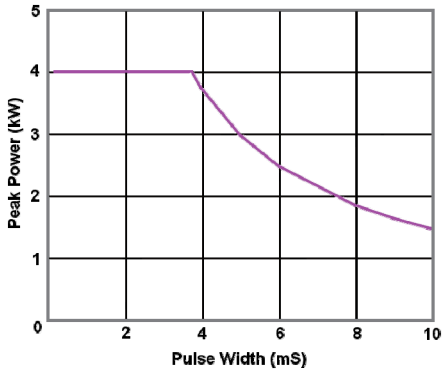
Average Power	7W	Pulse Width Range	0.2mS to 10mS
Peak Power	2.5kW @ 2.0mS	Pulse Width Resolution	0.02mS or 0.1mS
Pulse Energy	7J @ 5.0mS	Maximum Duty Cycle	90%
Max Rep Rate	30Hz	PWM Frequency	50kHz

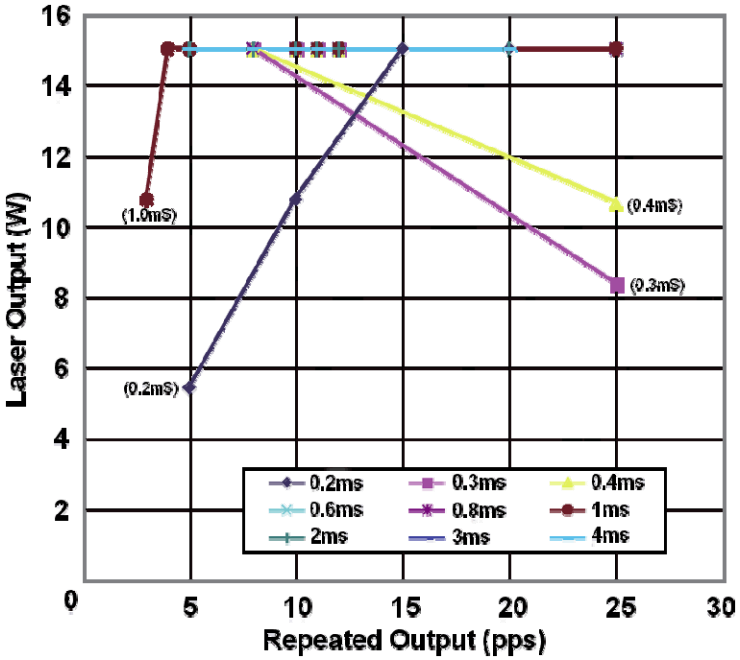


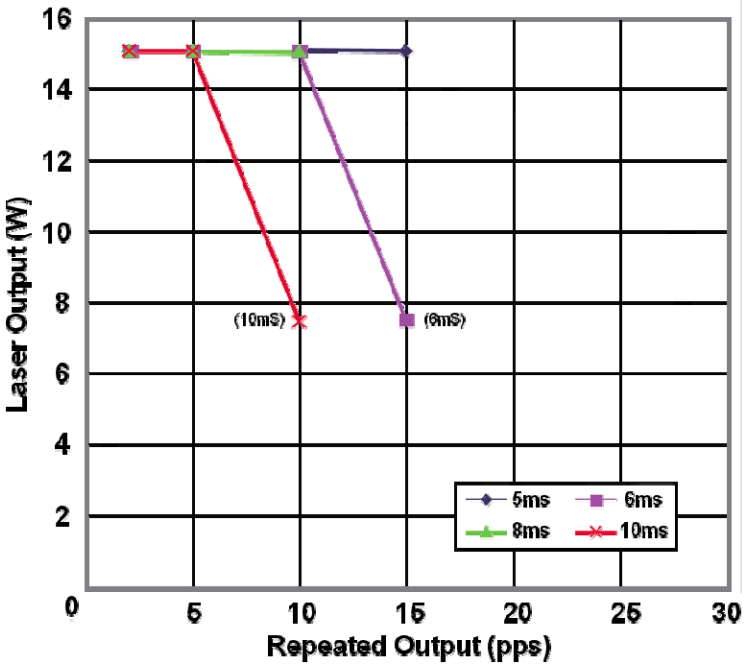


LW15A / ML-2050A **1064nm**

Average Power	15W
Peak Power	4kW @ 2.0mS
Pulse Energy	15J @ 5.0mS
Max Rep Rate	30Hz
Pulse Width Range	0.2mS to 10mS
Pulse Width Resolution	0.02mS or 0.1mS
Maximum Duty Cycle	90%
PWM Frequency	50kHz

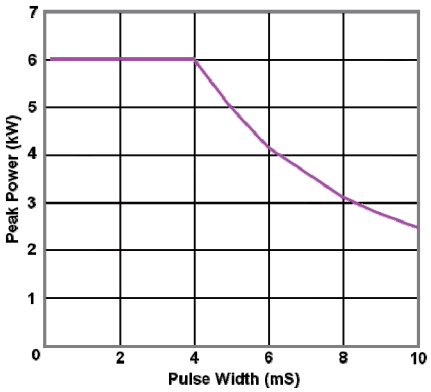


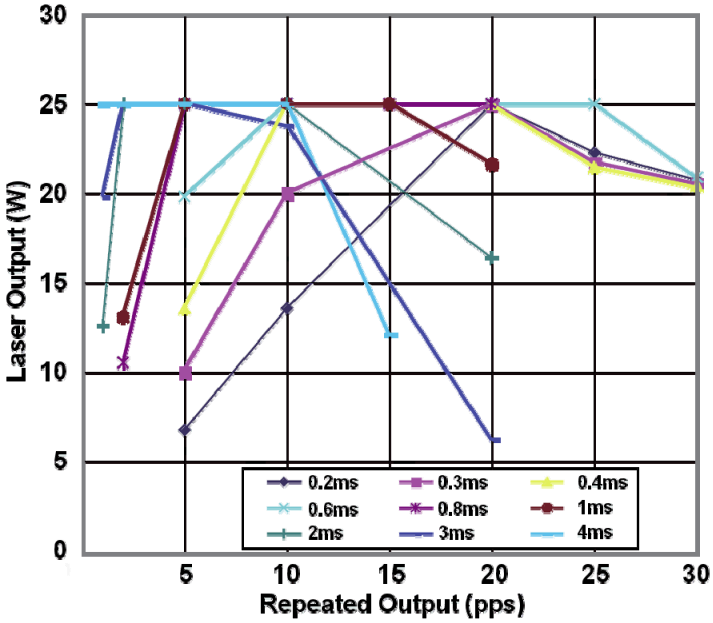


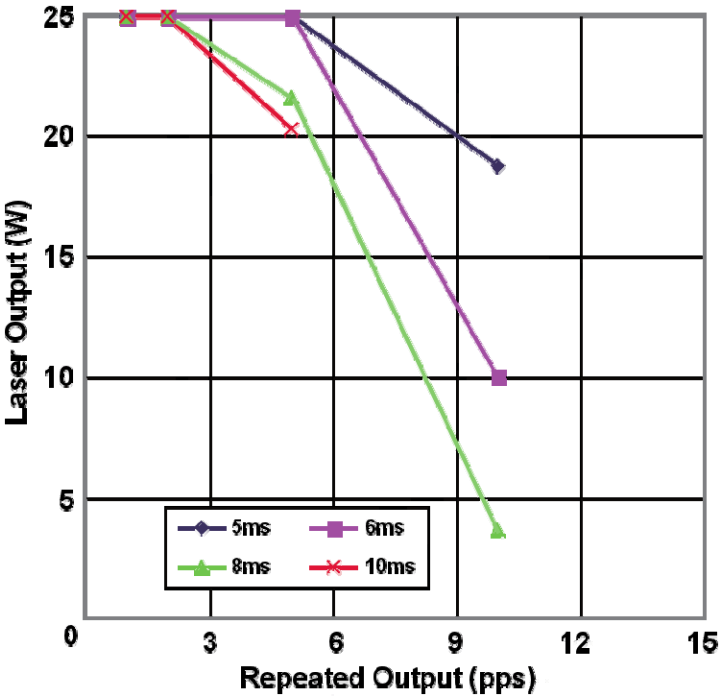


LW25A / ML-2150A **1064nm**

Average Power	25W
Peak Power	6kW @ 2.0mS
Pulse Energy	25J @ 5.0mS
Max Rep Rate	30Hz
Pulse Width Range	0.2mS to 10mS
Pulse Width Resolution	0.02mS or 0.1mS
Maximum Duty Cycle	90%
PWM Frequency	50kHz

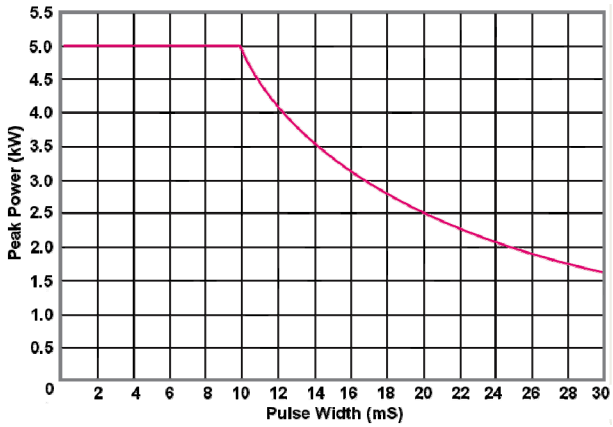


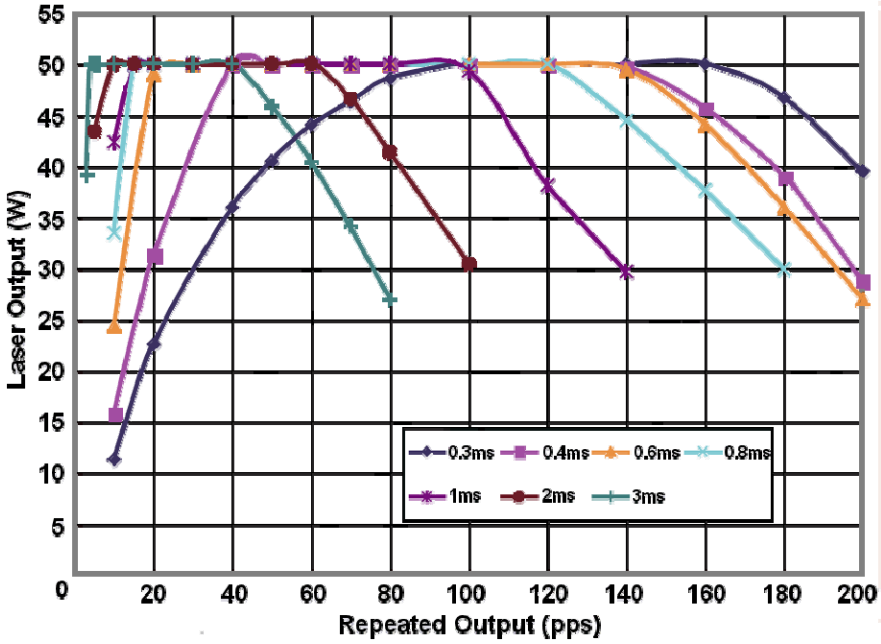


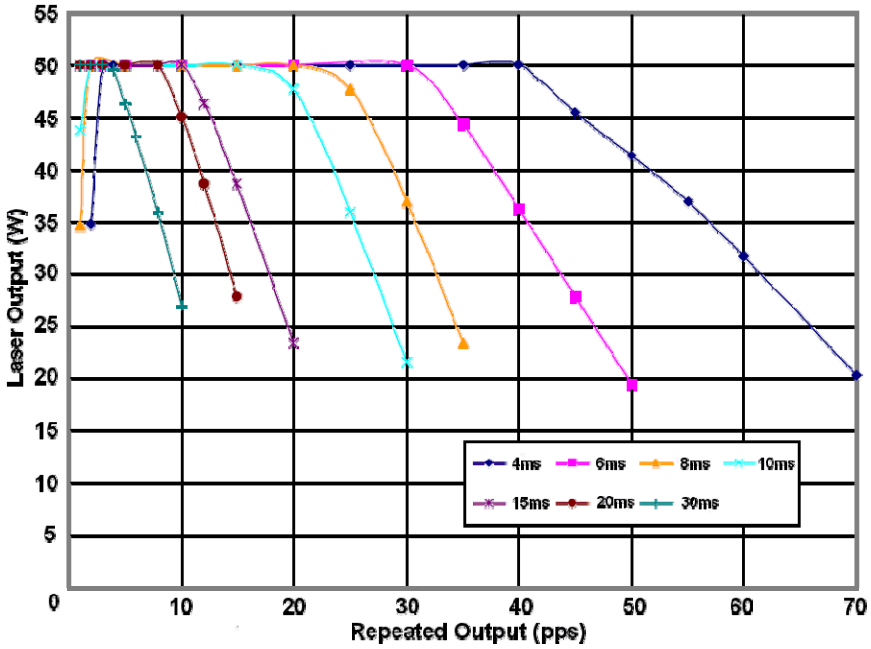


LW50A(C) / ML-2351A(F) **1064nm**

Average Power	50W
Peak Power	5kW @ 10mS
Pulse Energy	50J @ 10mS
Max Rep Rate	200Hz
Pulse Width Range	0.25mS to 30mS
Pulse Width Resolution	0.05mS or 0.1mS
Maximum Duty Cycle	90%
PWM Frequency	20kHz

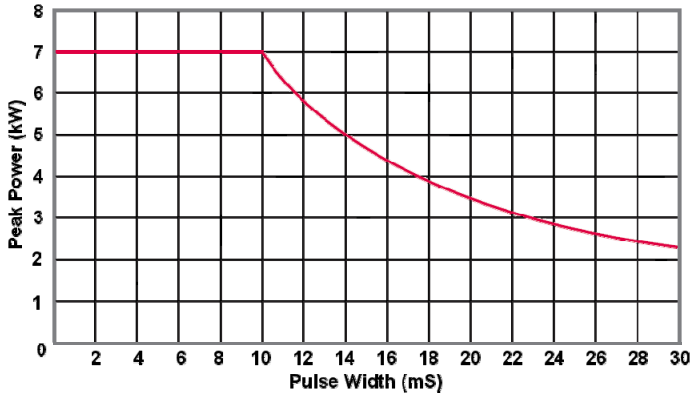


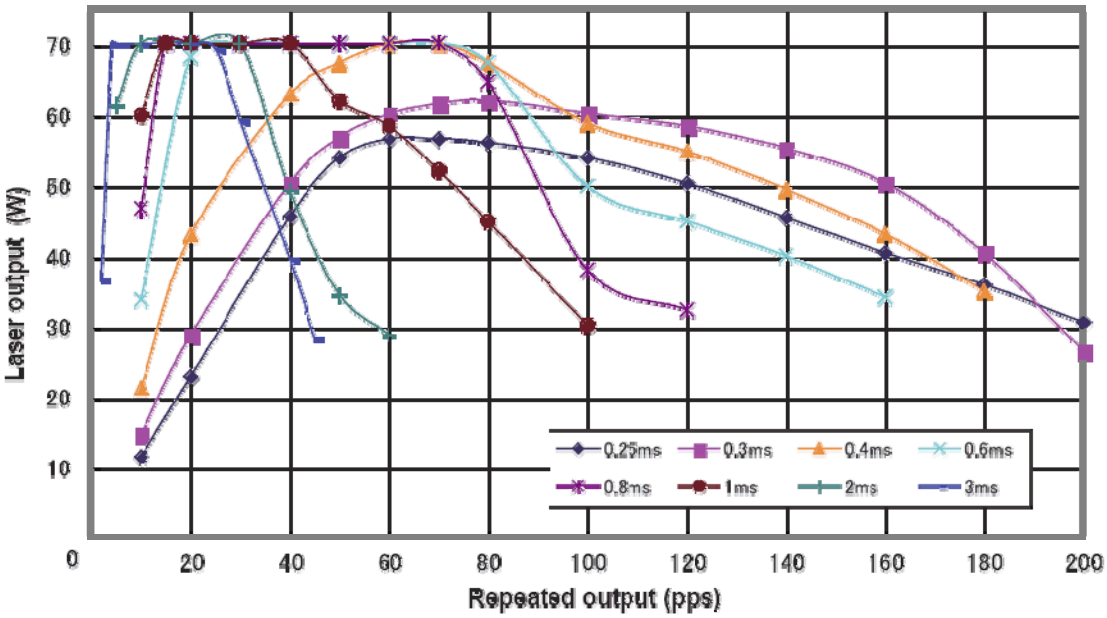


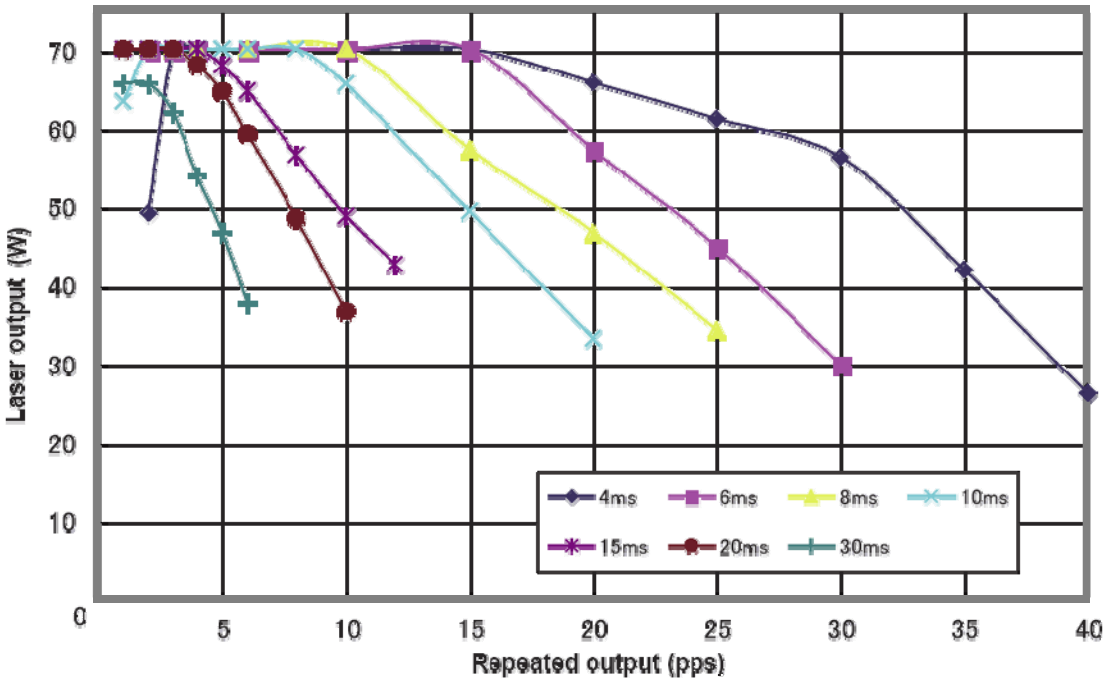


LW70A / ML-2350A **1064nm**

Average Power	70W
Peak Power	7kW @ 10mS
Pulse Energy	70J @ 10mS
Max Rep Rate	200Hz
Pulse Width Range	0.25mS to 30mS
Pulse Width Resolution	0.05mS or 0.1mS
Maximum Duty Cycle	90%
PWM Frequency	20kHz

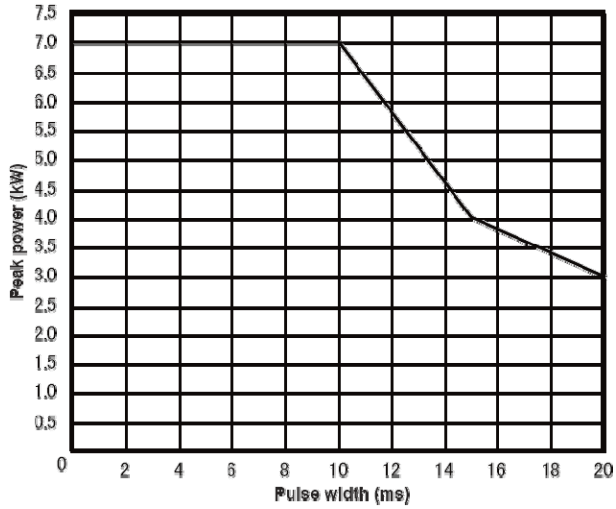


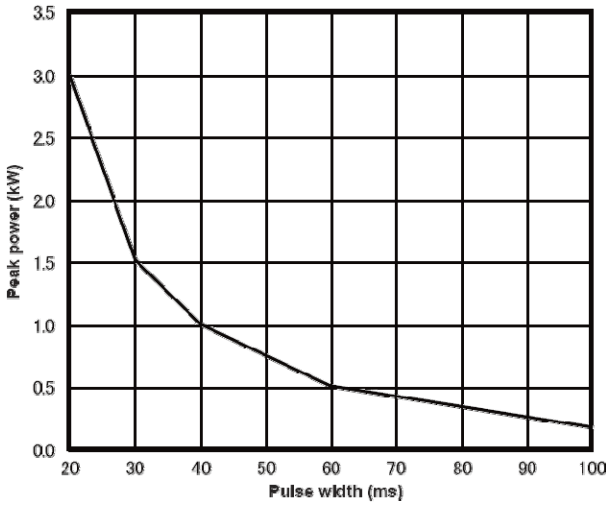


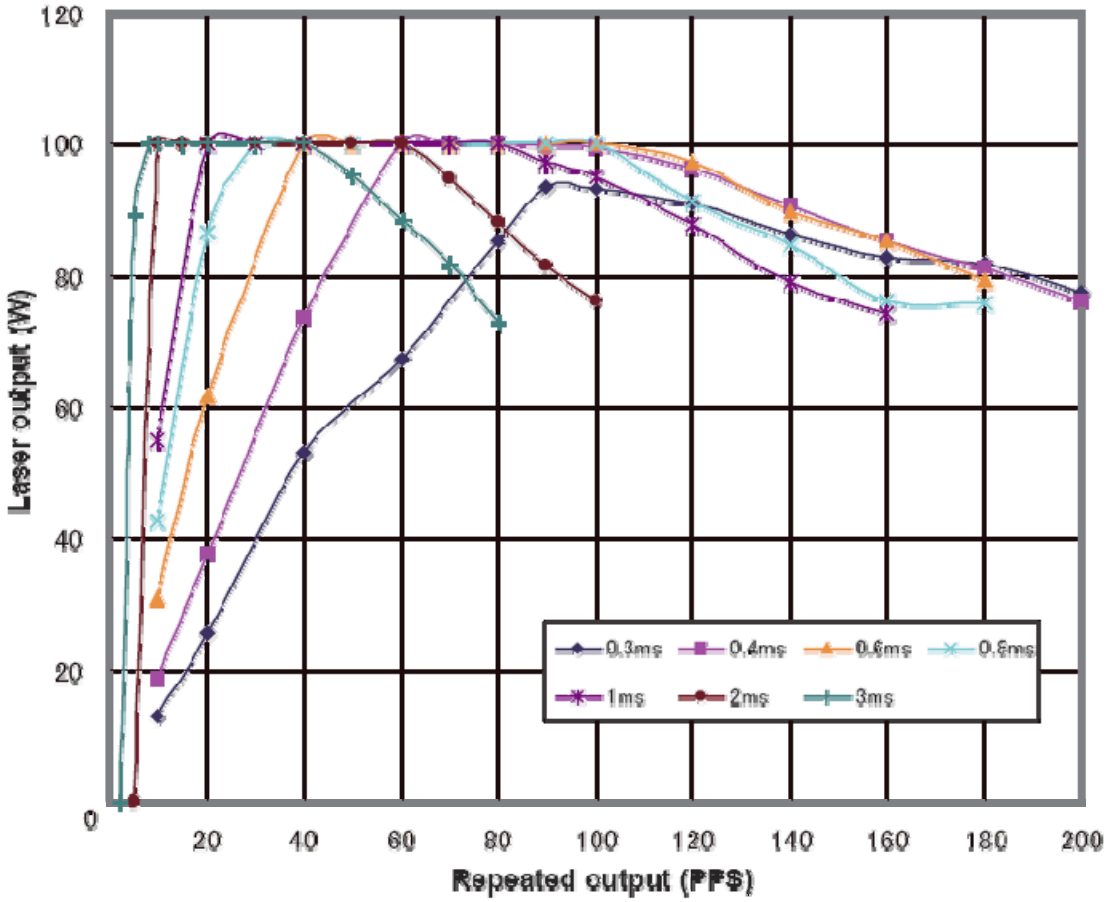


LW100A / ML-2451A **1064nm** **Reference only – not a Unitek released product.**

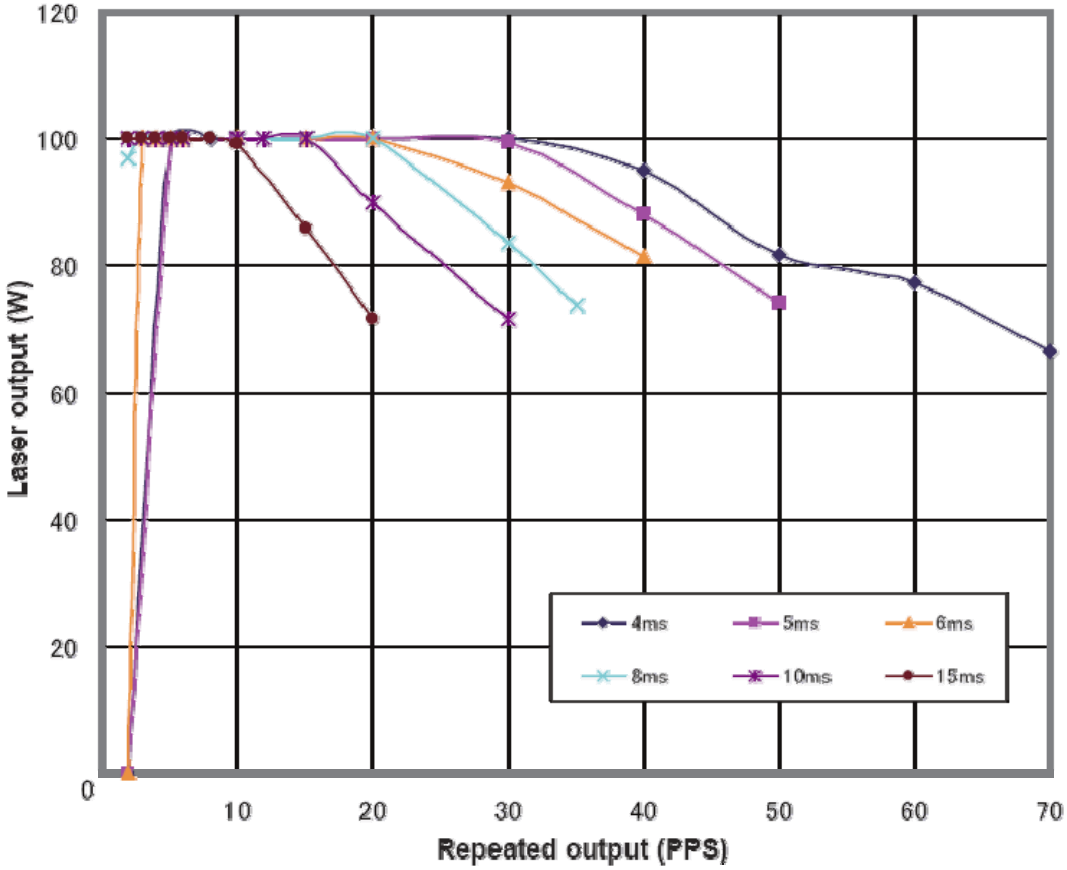
Average Power	**100W**	**Pulse Width Range**	**0.25mS to 99.9mS**
Peak Power	**5kW @ 10mS**	**Pulse Width Resolution**	**0.05mS or 0.1mS**
Pulse Energy	**50J @ 10mS**	**Maximum Duty Cycle**	**90%**
Max Rep Rate	**200Hz**	**PWM Frequency**	**20kHz**

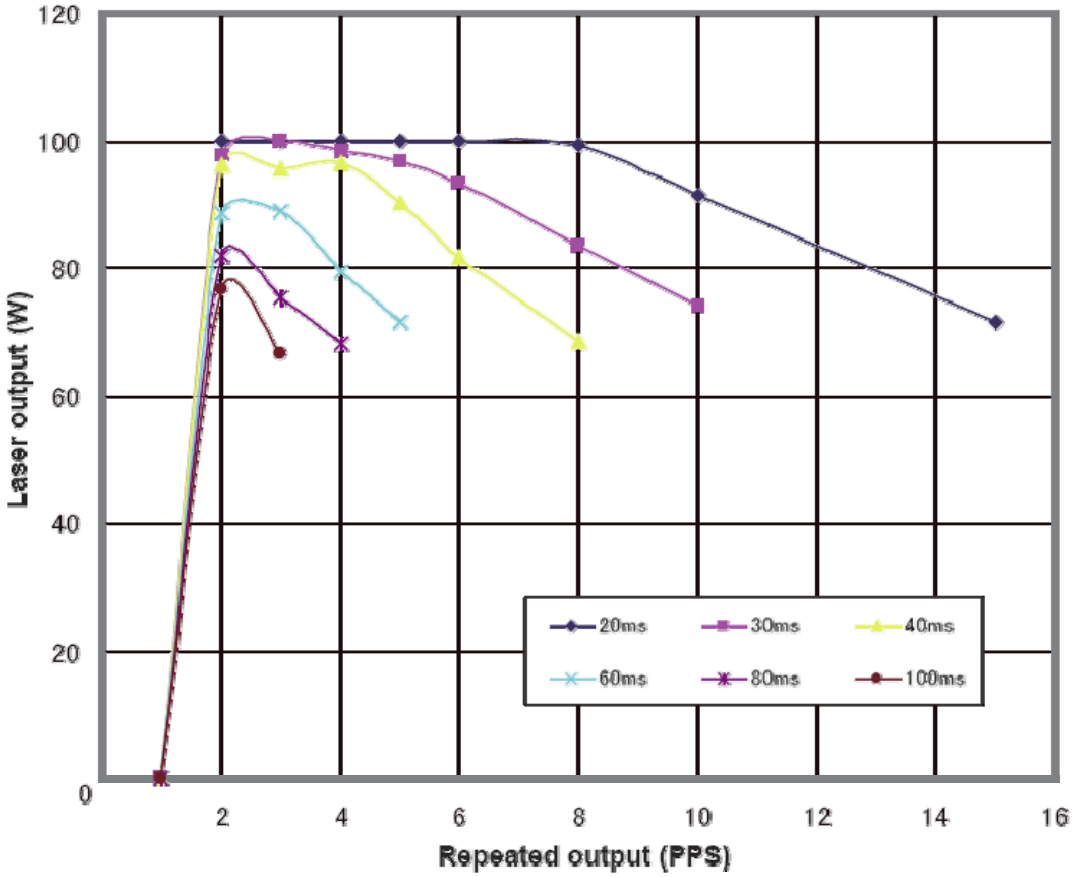






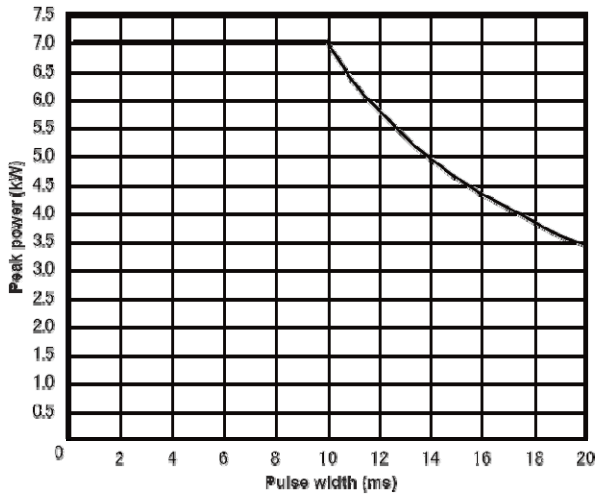
LW100A / ML-2451A (continued)

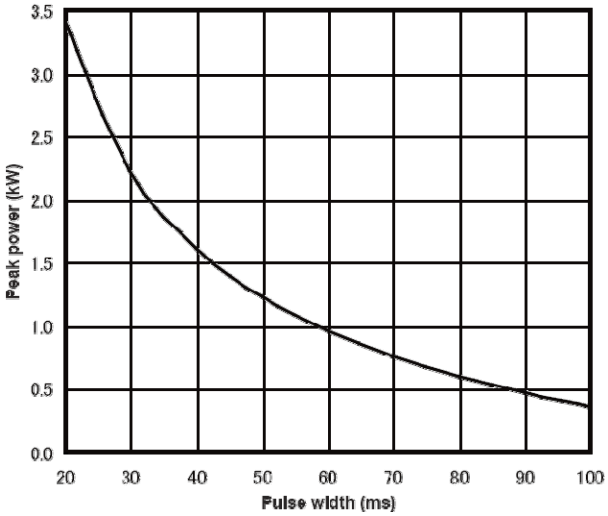


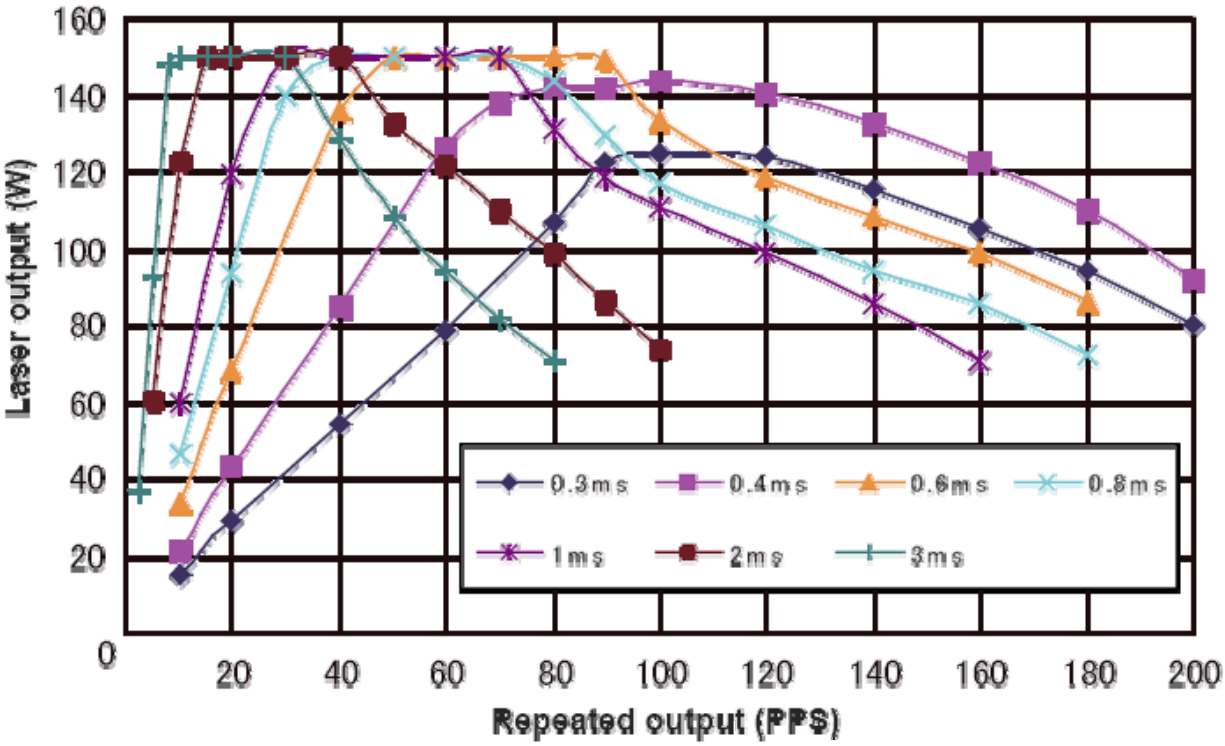


LW150A / ML-2450A **1064nm**

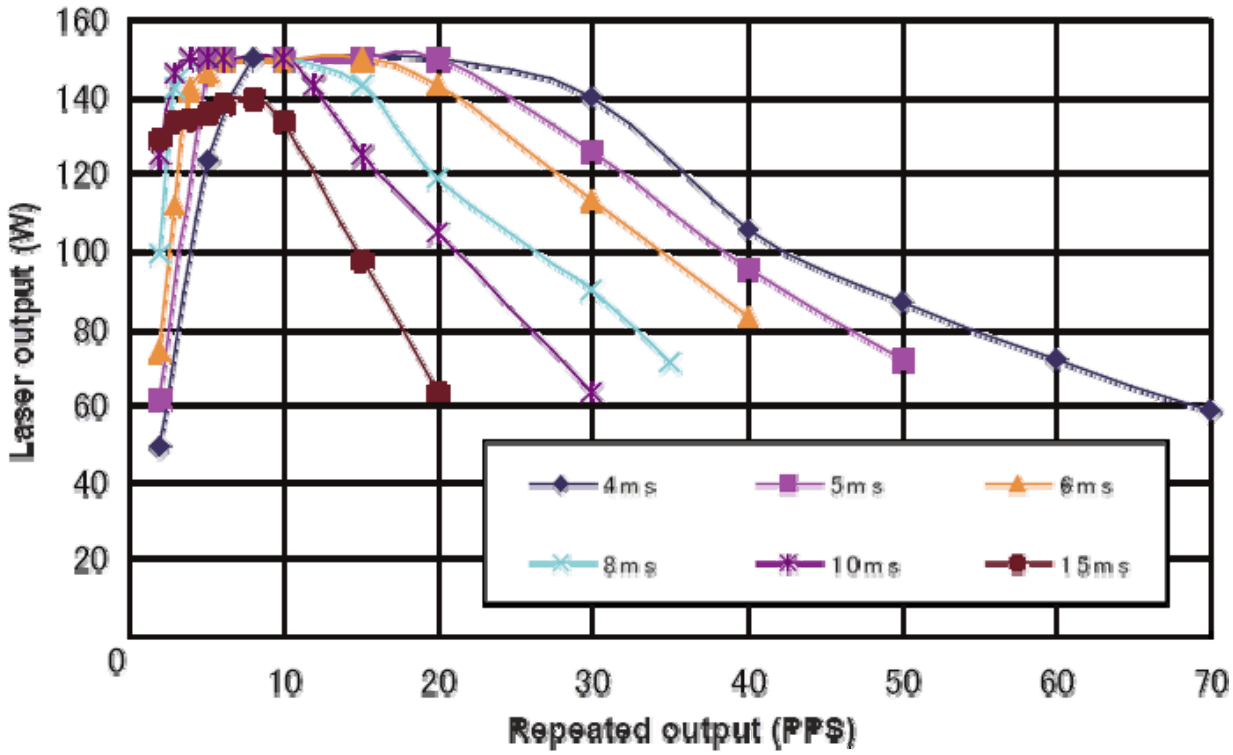
Average Power	**150W**	**Pulse Width Range**	**0.25mS to 99.9mS**
Peak Power	**7kW @ 10mS**	**Pulse Width Resolution**	**0.05mS or 0.1mS**
Pulse Energy	**70J @ 10mS**	**Maximum Duty Cycle**	**90%**
Max Rep Rate	**200Hz**	**PWM Frequency**	**20kHz**

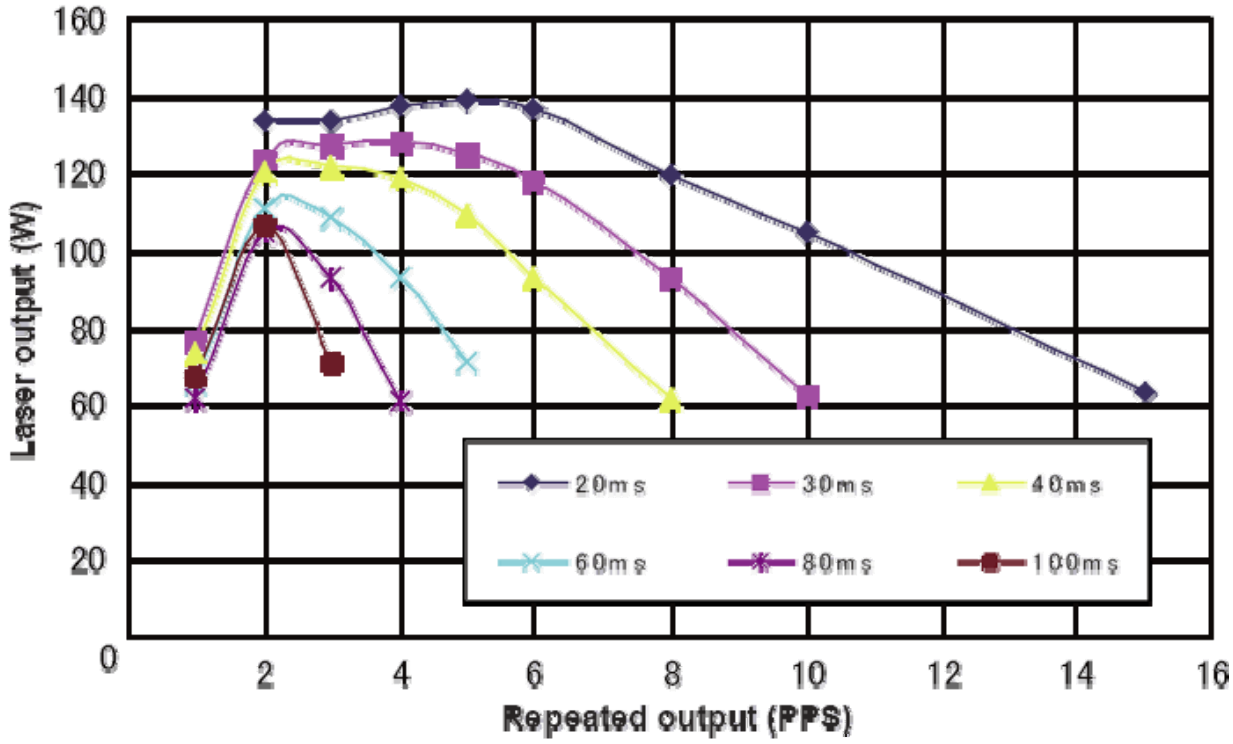






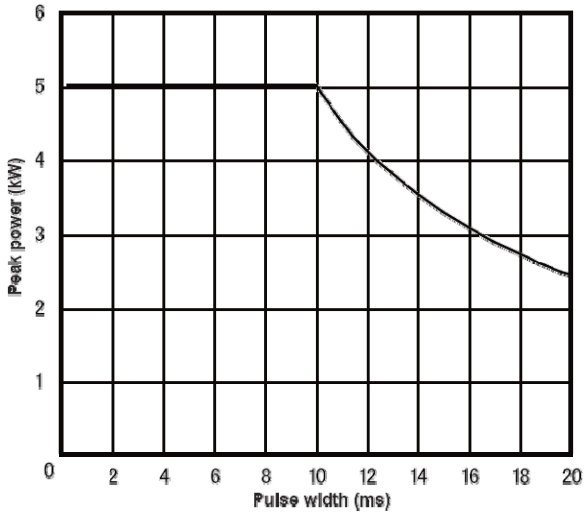
LW150A / ML-2450A (continued)

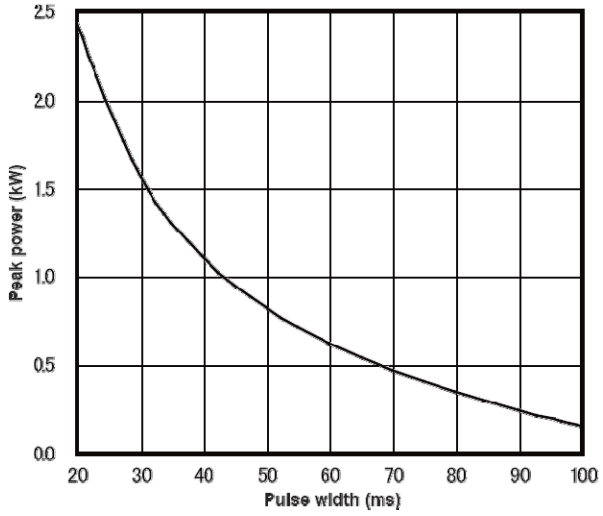


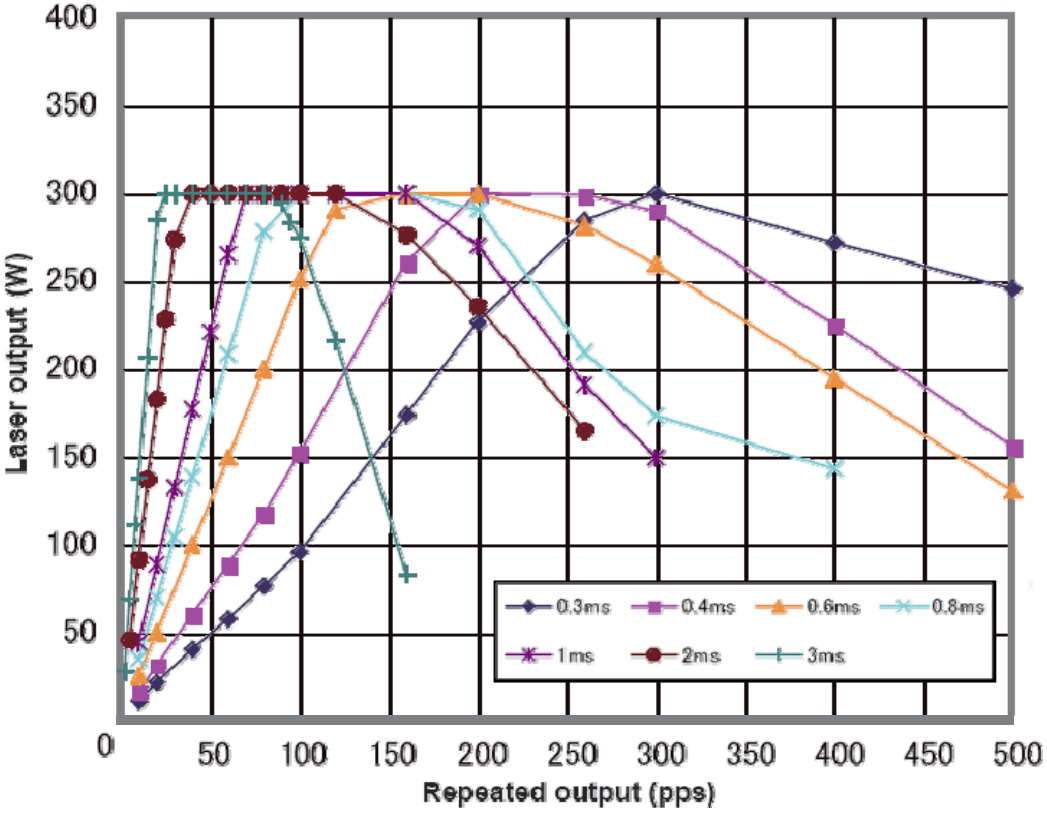


LW300A / ML-2551A **1064nm**

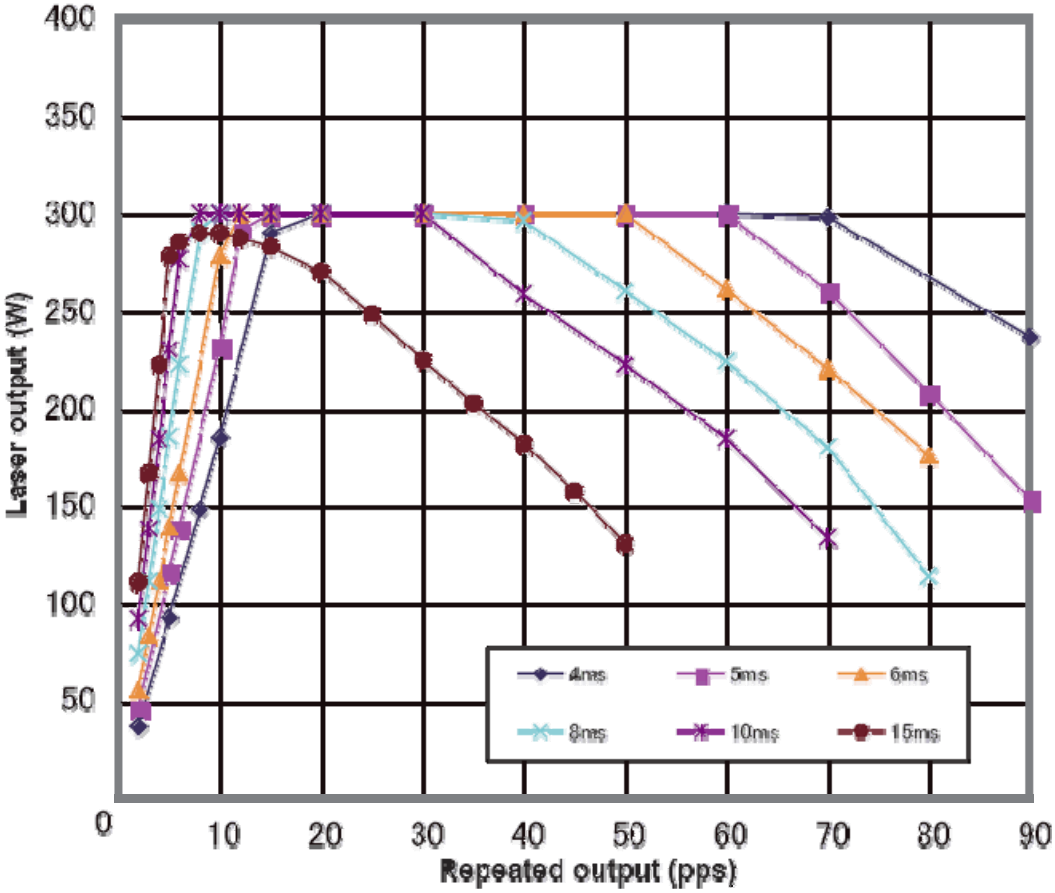
Average Power	**300W**	**Pulse Width Range**	**0.25mS to 99.9mS**
Peak Power	**5kW @ 10mS**	**Pulse Width Resolution**	**0.05mS or 0.1mS**
Pulse Energy	**50J @ 10mS**	**Maximum Duty Cycle**	**90%**
Max Rep Rate	**500Hz**	**PWM Frequency**	**20kHz**

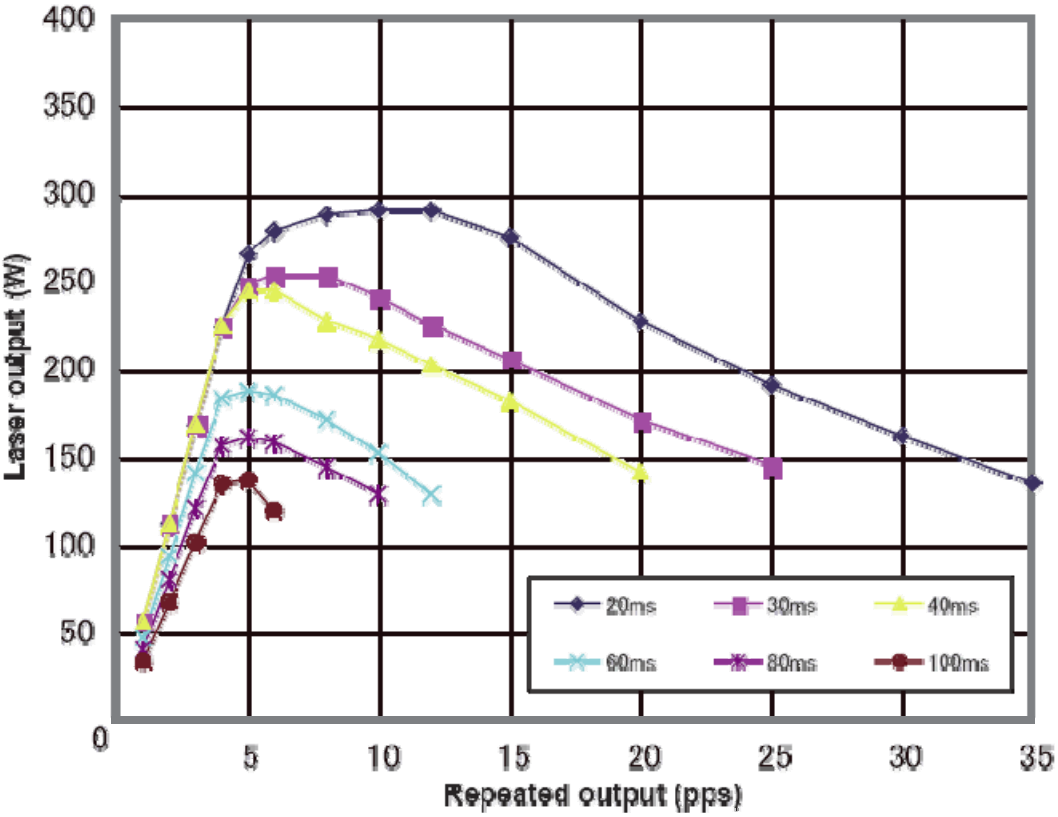






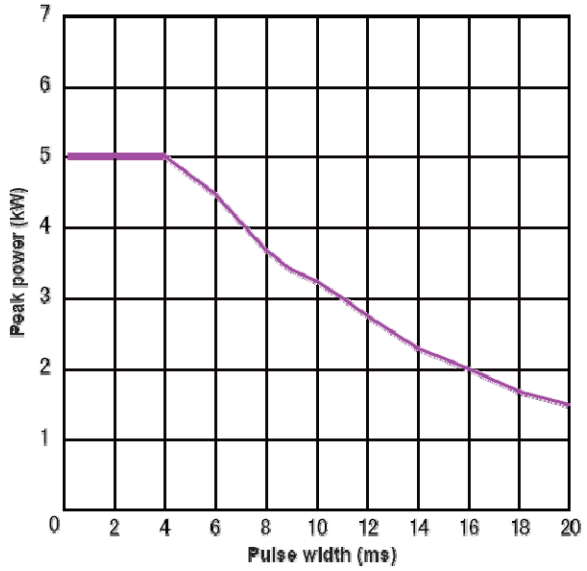
LW300A / ML-2551A (continued)

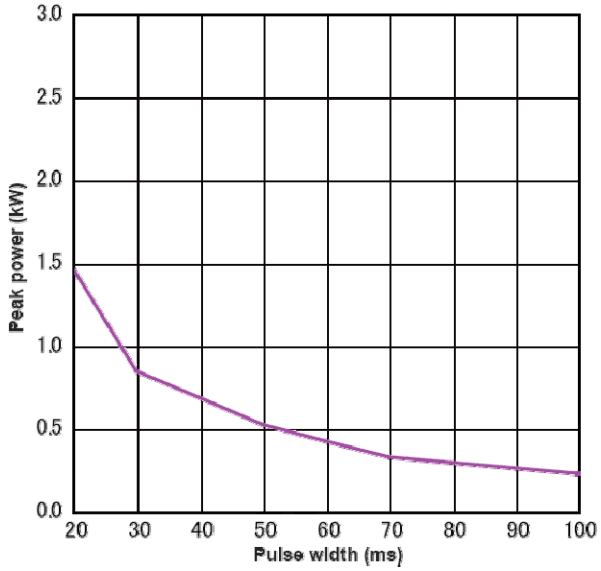


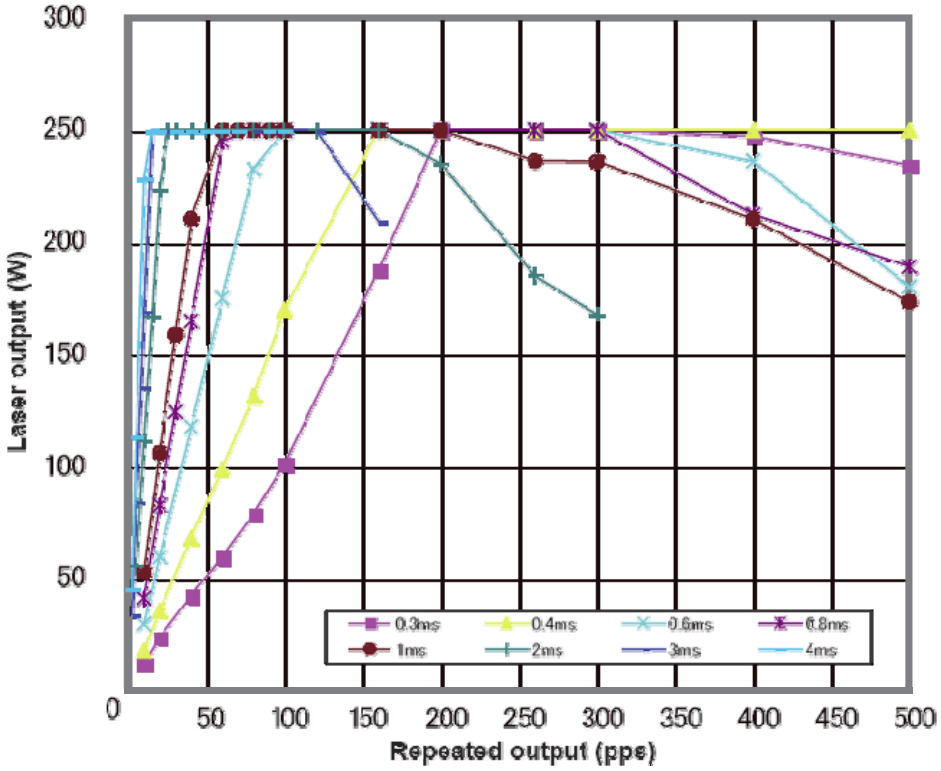


LW300AH / ML-2552A **1064nm**

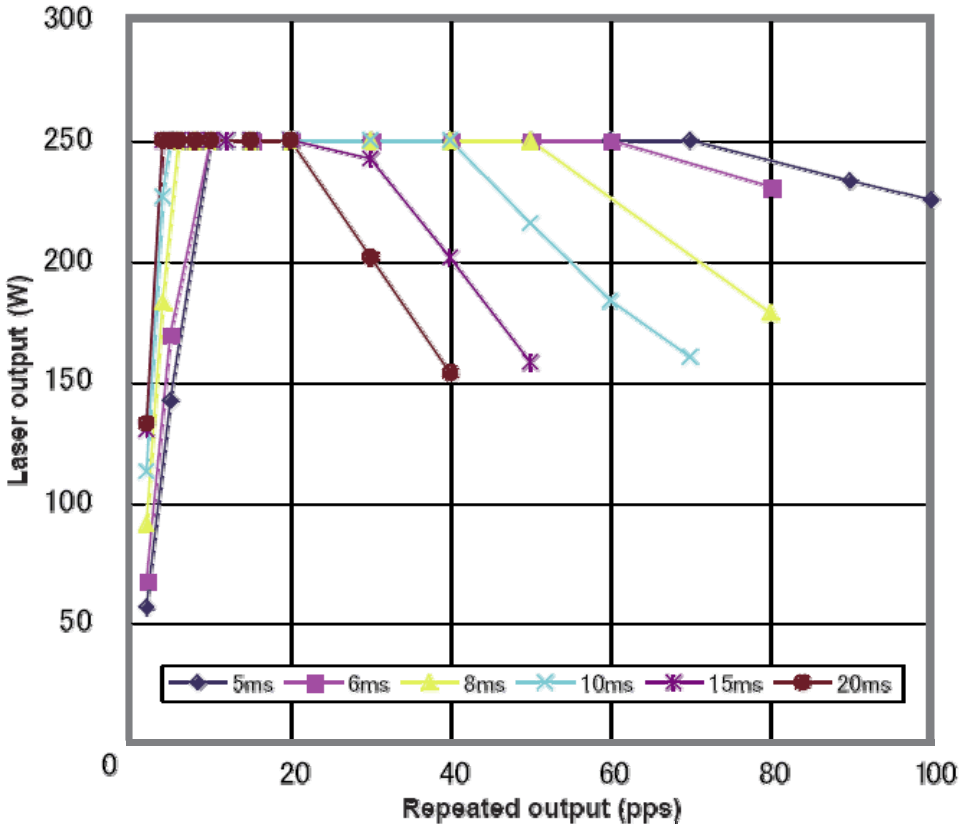
Average Power	**300W**	**Pulse Width Range**	**0.25mS to 99.9mS**
Peak Power	**5kW @ 4mS**	**Pulse Width Resolution**	**0.05mS or 0.1mS**
Pulse Energy	**20J @ 4mS**	**Maximum Duty Cycle**	**90%**
Max Rep Rate	**500Hz**	**PWM Frequency**	**20kHz**

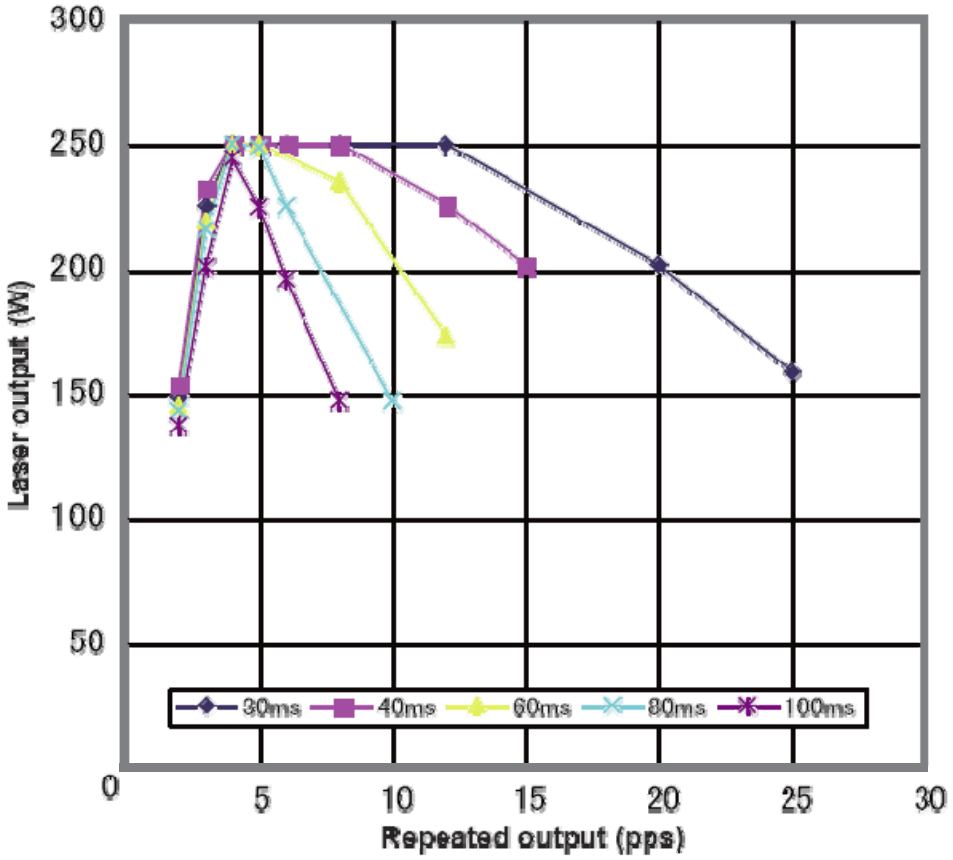






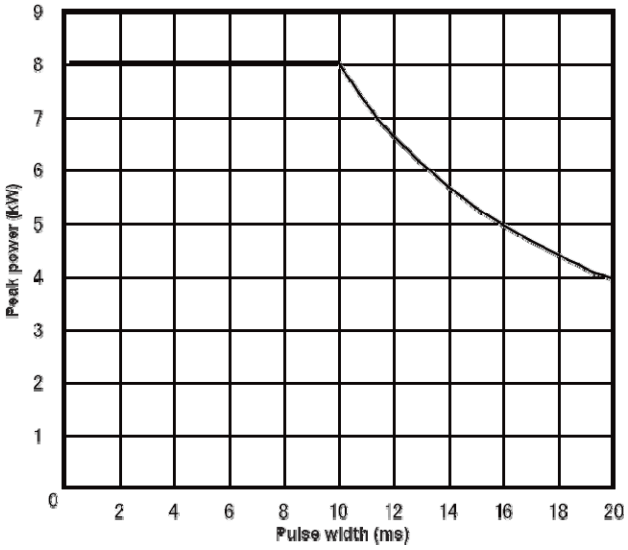
LW300AH / ML-2552A (continued)

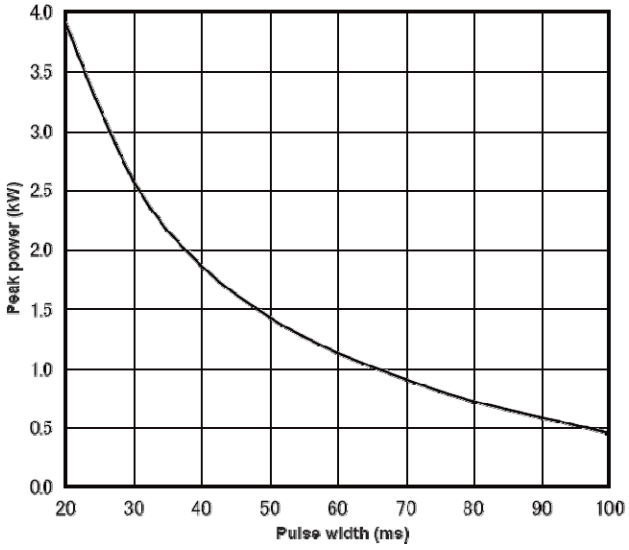


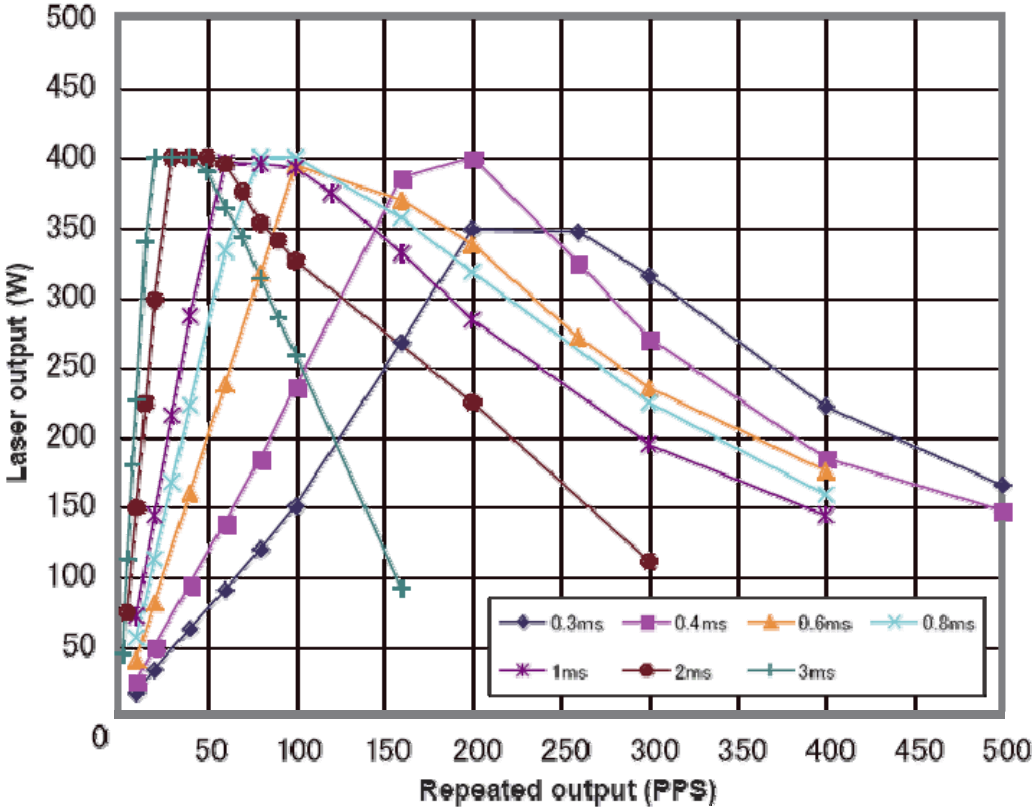


LW400A / ML-2550A **1064nm**

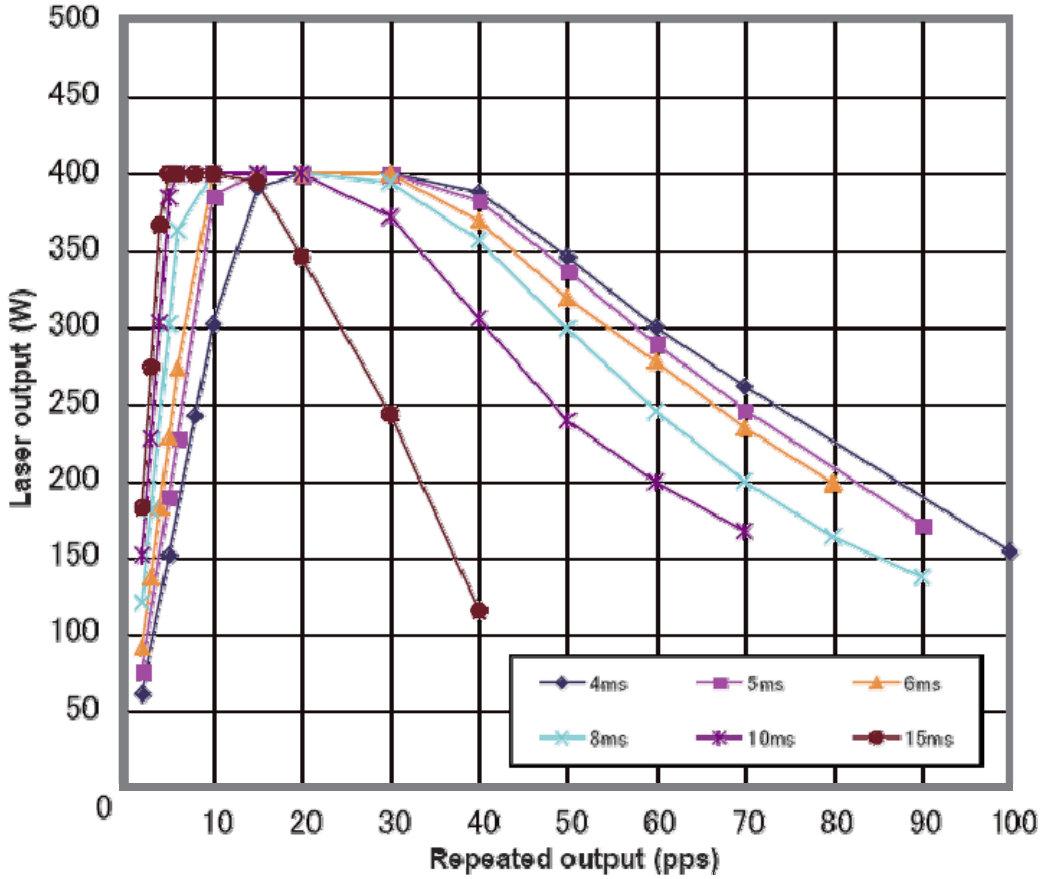
Average Power	**400W**	**Pulse Width Range**	**0.25mS to 99.9mS**
Peak Power	**8kW @ 10mS**	**Pulse Width Resolution**	**0.05mS or 0.1mS**
Pulse Energy	**80J @ 10mS**	**Maximum Duty Cycle**	**90%**
Max Rep Rate	**500Hz**	**PWM Frequency**	**20kHz**

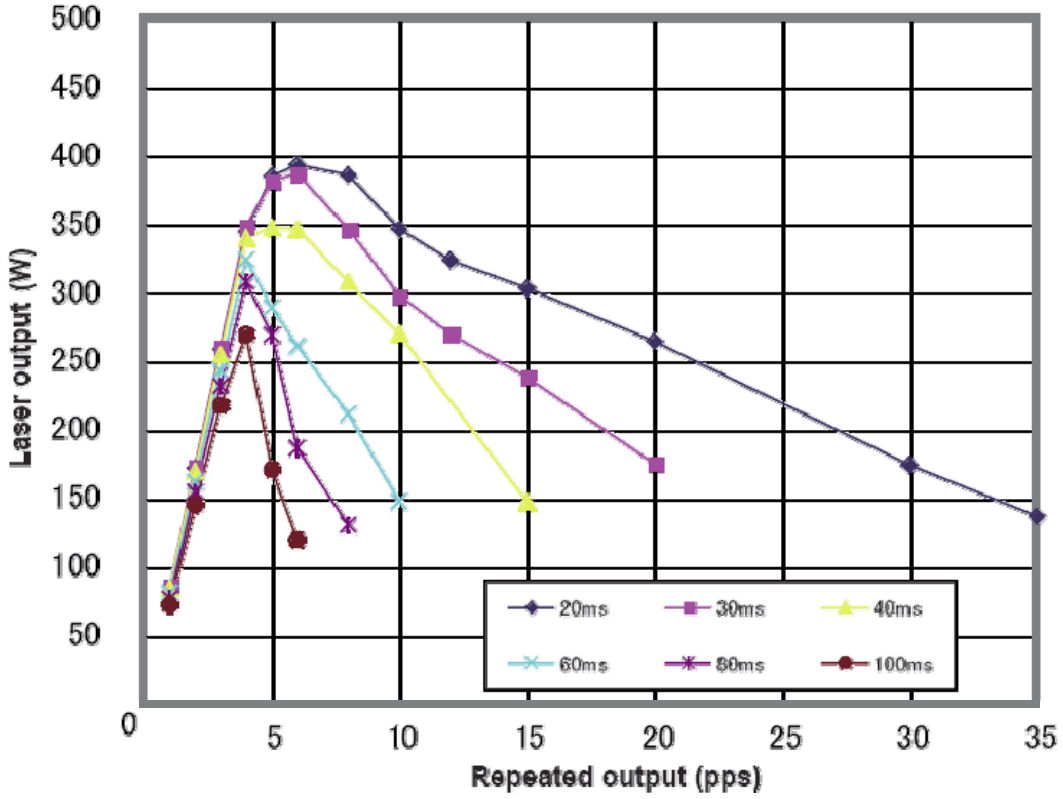






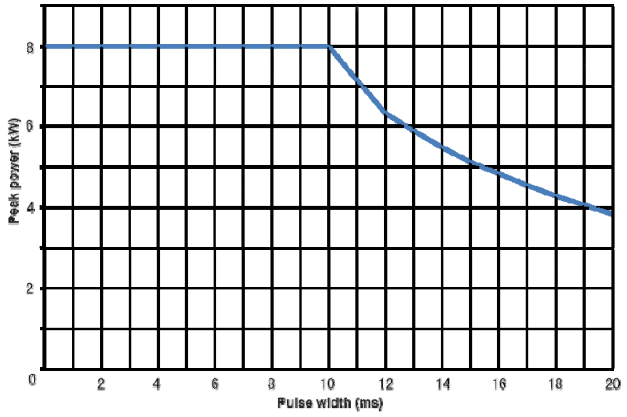
LW400A / ML-2550A (continued)

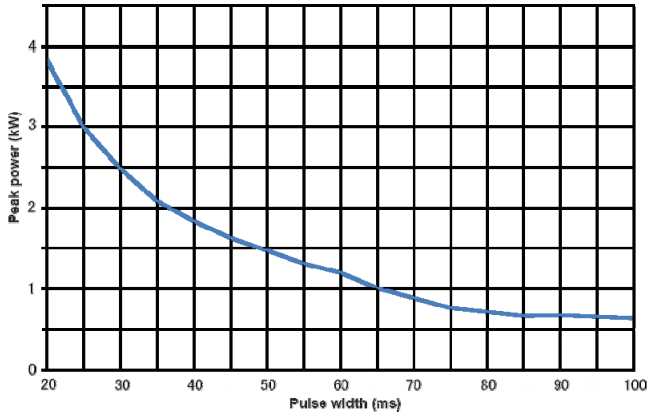


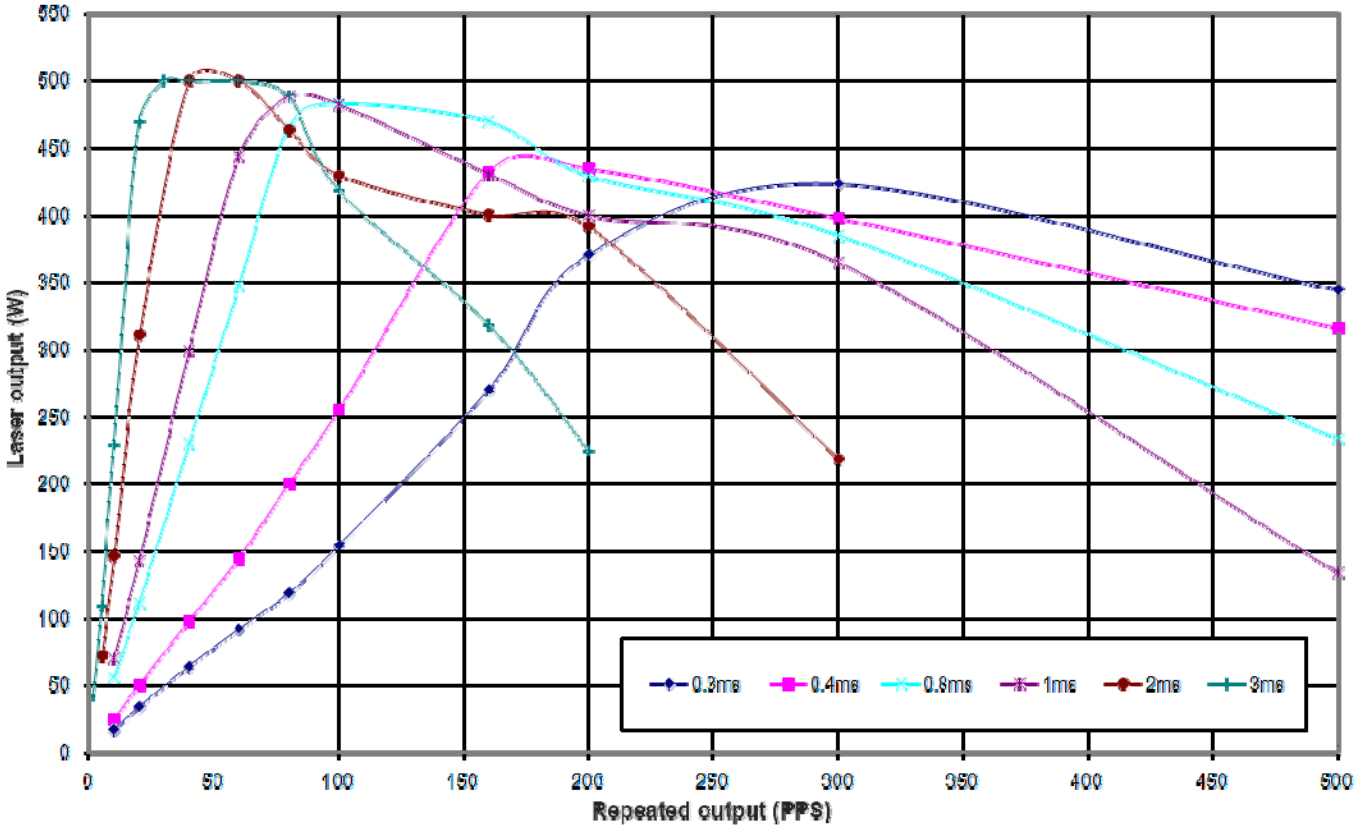


LW500A / ML-2651B **1064nm**

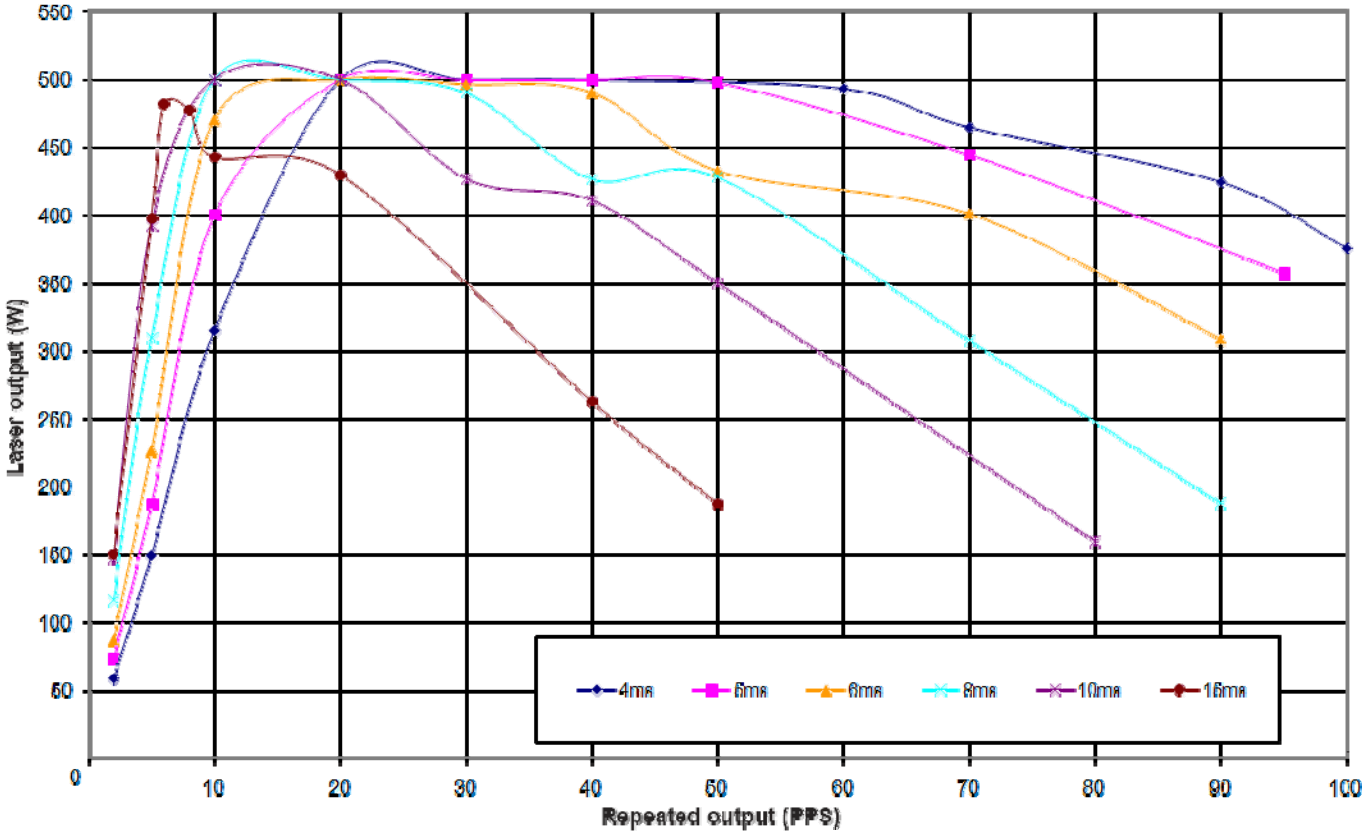
Average Power	**500W**	**Pulse Width Range**	**0.25mS to 99.9mS**
Peak Power	**8kW @ 10mS**	**Pulse Width Resolution**	**0.05mS or 0.1mS**
Pulse Energy	**80J @ 10mS**	**Maximum Duty Cycle**	**90%**
Max Rep Rate	**500Hz**	**PWM Frequency**	**20kHz**

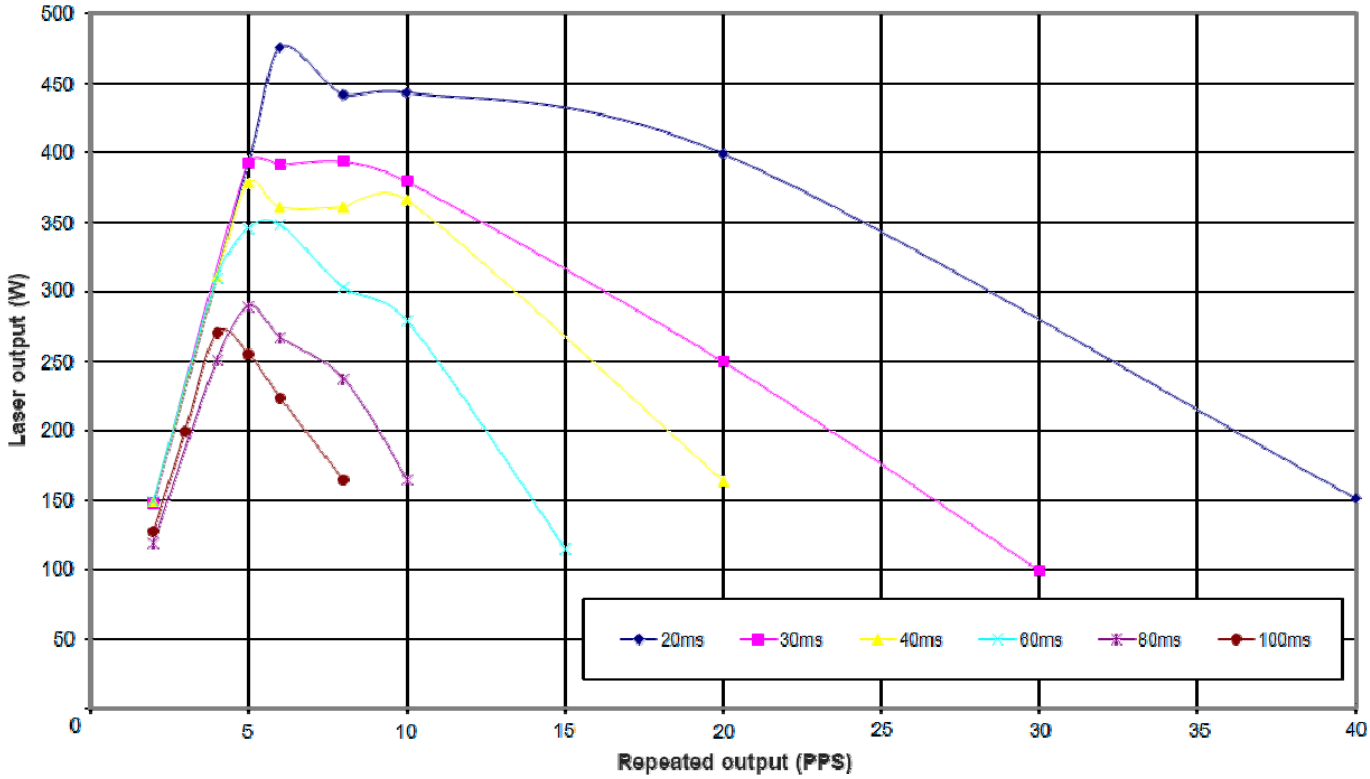






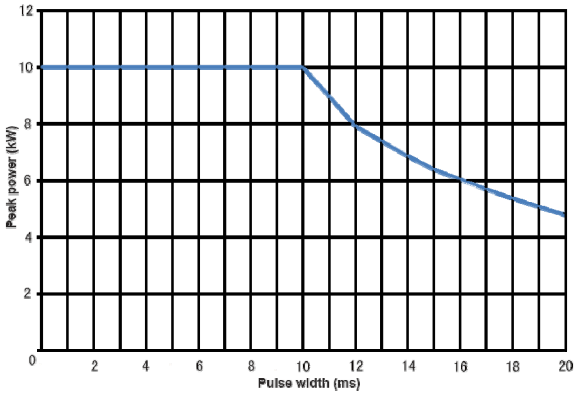
LW500A / ML-2651B (continued)

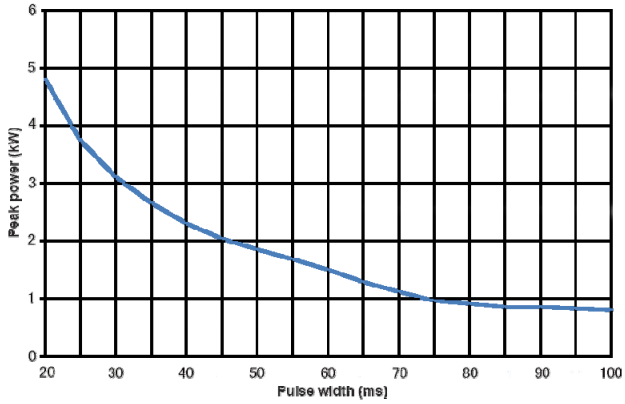


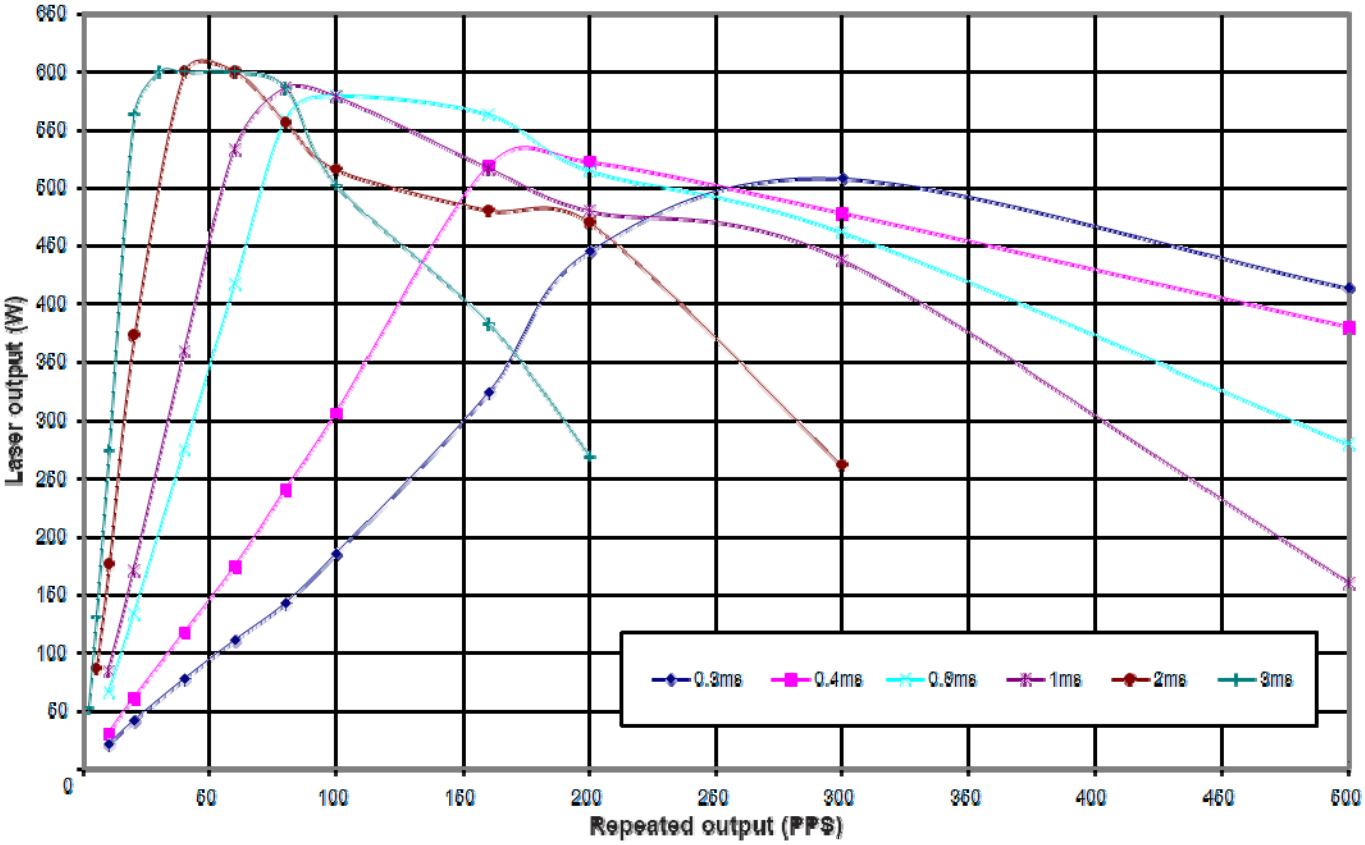


LW600A / ML-2650B **1064nm**

Average Power	**600W**	**Pulse Width Range**	**0.25mS to 99.9mS**
Peak Power	**10kW @ 10mS**	**Pulse Width Resolution**	**0.05mS or 0.1mS**
Pulse Energy	**100J @ 10mS**	**Maximum Duty Cycle**	**90%**
Max Rep Rate	**500Hz**	**PWM Frequency**	**20kHz**







LW600A / ML-2650B (continued)