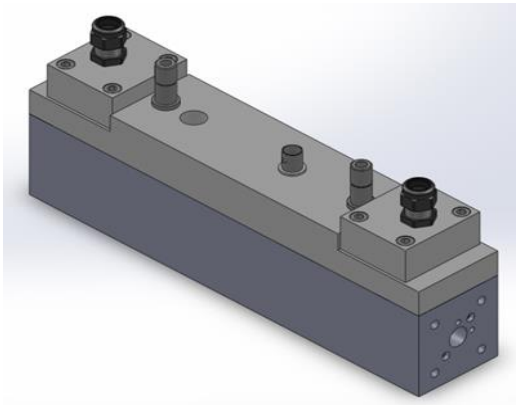
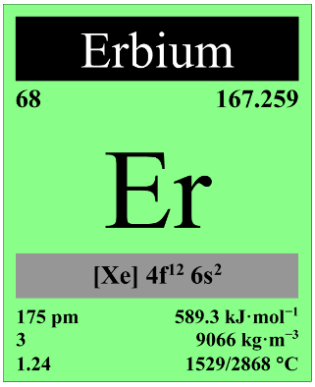
30 Watt 2.94 µm SOLID-STATE RESONATOR





Compact, Room-Temperature Water-Cooled, Flashlamp-Pumped Er:YAG Resonator Assembly

MegaWatt Lasers is pleased to offer off-the-shelf laser resonator assemblies. These resonators are intended for OEM's or R&D applications. Resonator assemblies include pump chamber, flashlamp, laser rod, trigger electronics, and resonator optics tailored for the specific application. This resonator assembly is perfectly suited as a laboratory laser which can easily transform into an OEM design. Also available are resonator assemblies using other solid-state laser media, such as CTH:YAG, Er:Glass, Nd:YAG, Nd: Glass, Ruby, and Alexandrite. MegaWatt Lasers also offers custom resonators with higher average powers 40 W (2.09 µm) and 200 W @ (1.06 µm) as well as turnkey systems. Our Engineering department has considerable experience assisting OEM customers with custom as well as complete system designs.

Table of Standard Specifications for R4X100C2-ER resonator			
Parameter	**Value**	**Unit**	**Notes**
Wavelength	2.94	µm	
Resonator Output	30	W	10 – 30 Hz
Lamp Voltage	Nominal: 380 – 700	V	Typical range
Pulse Width	Nominal: 100 – 500	µs	350 µs Typical
Coolant Temp	25	°C	Deionized or Distilled H_2O, Free from organic contamination
Coolant Flow Rate	8 – 10	Liters/min	2 Gallons/min
Coolant Resistivity	0.2 – 1	MΩ·cm	Coolant Conductivity: 1 – 5 µS/cm
Pressure Drop	200 – 240	kPa	Return pressure should be < 35 kPa
Repetition Rate	5 – 30	Hz	Typical range
Recommended Pump Parameters Limits			
Energy	≤ 100	Joules	Pump energy is manually measured or the flash lamp driver has internal circuitry to measure.
Power	≤ 1300	Watts	Pump Energy * Repetition Rate
Peak Power	≤ 265	kW	Pump Energy / Pulse Width

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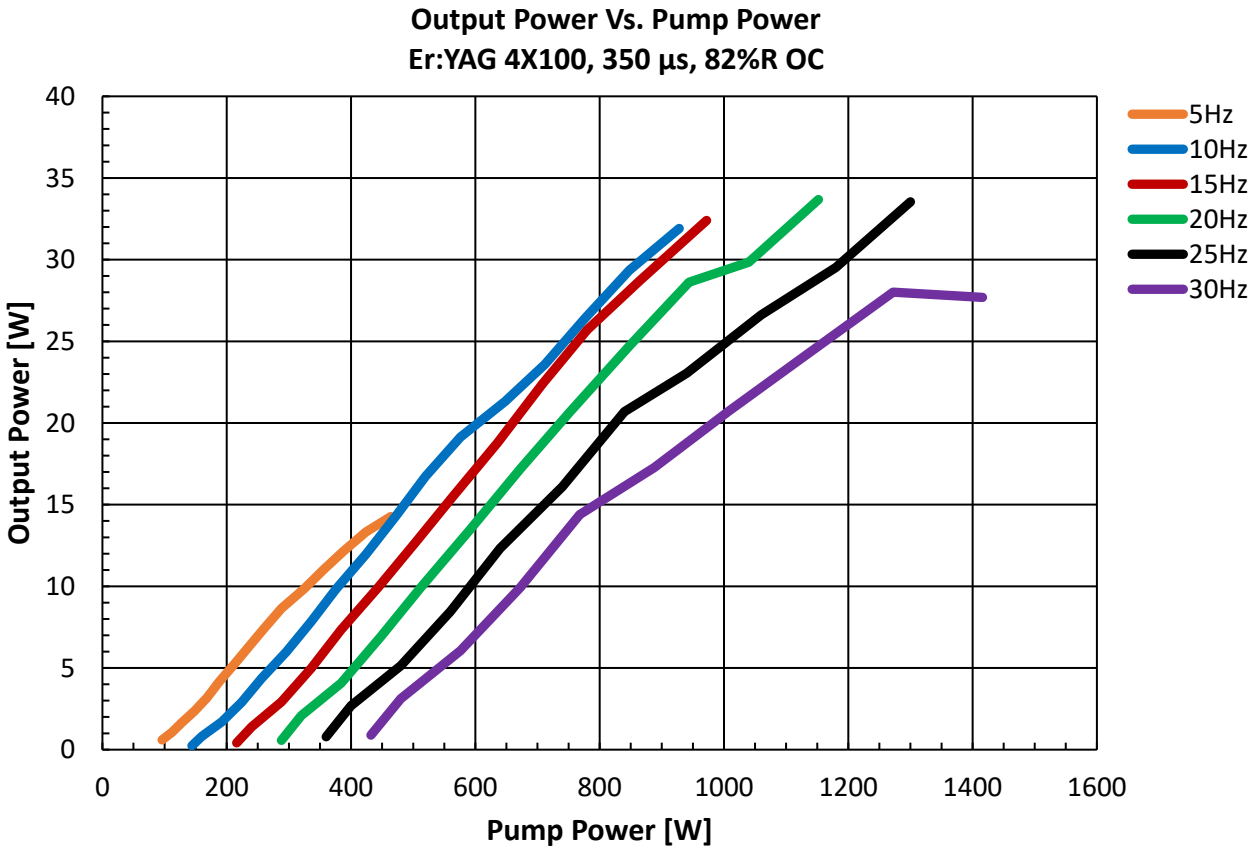

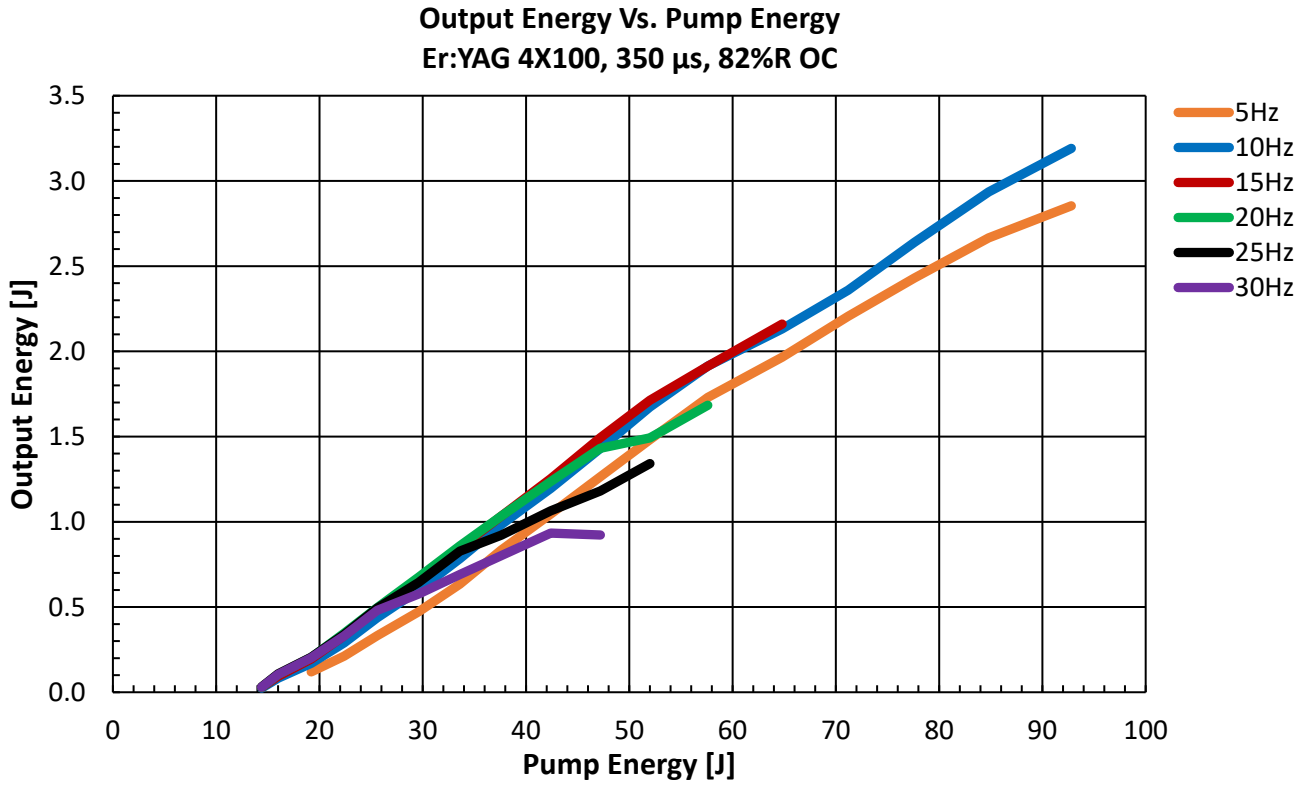

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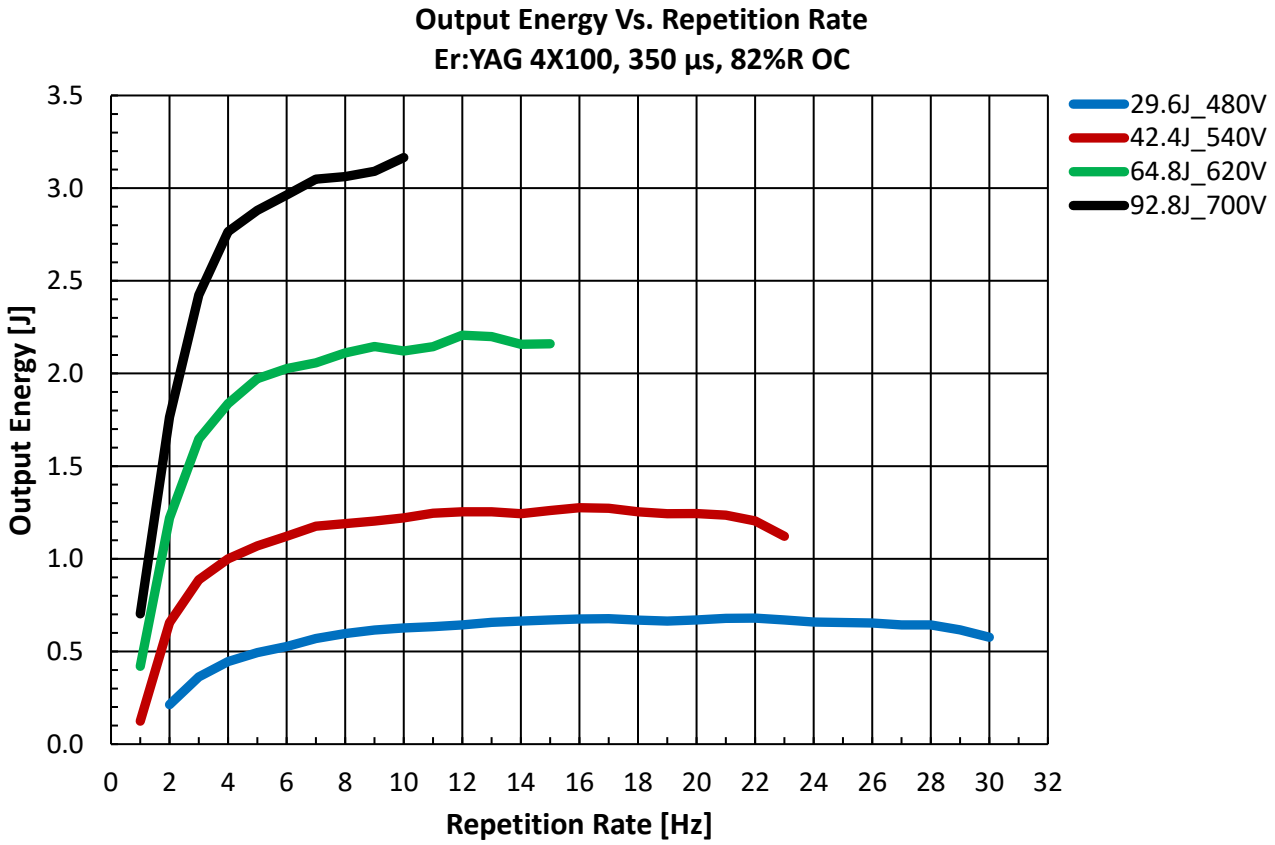

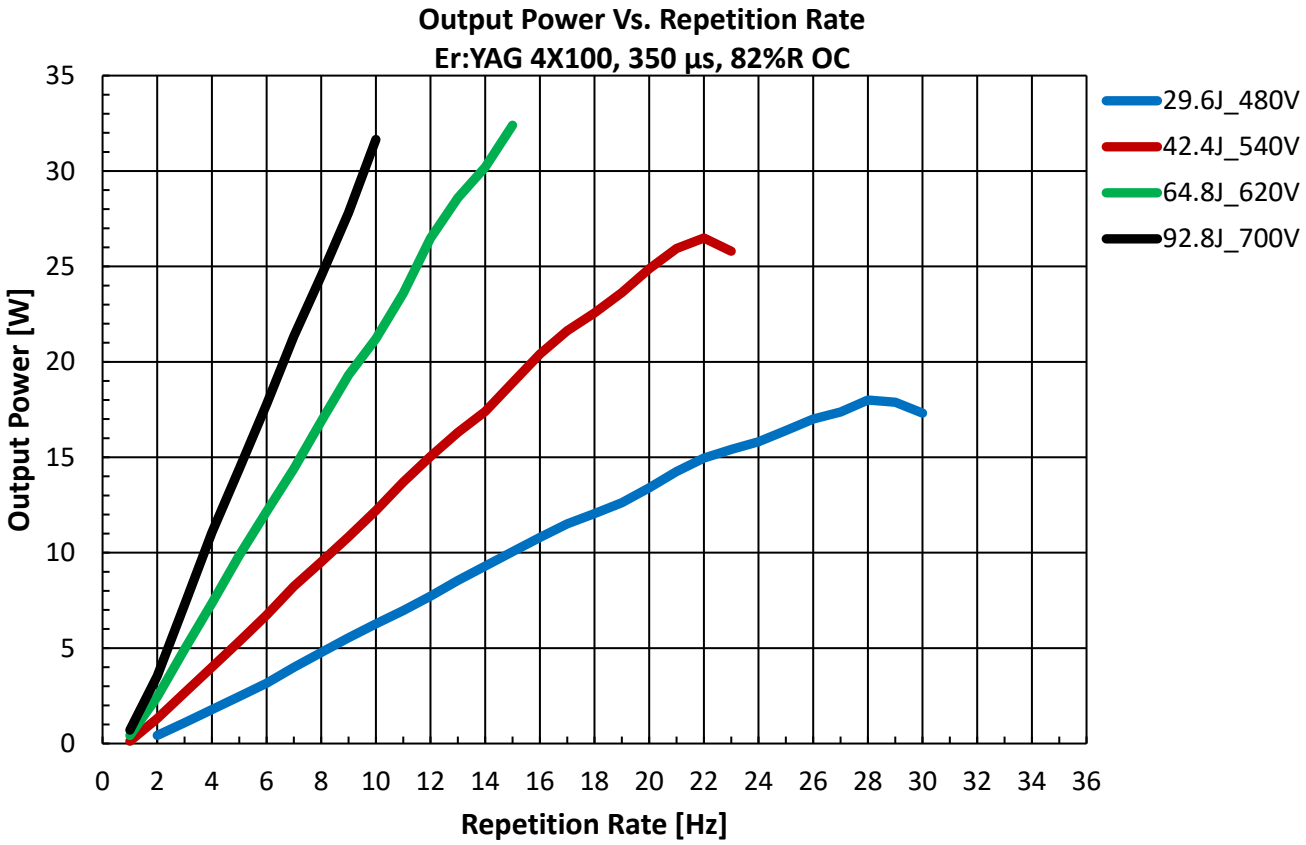

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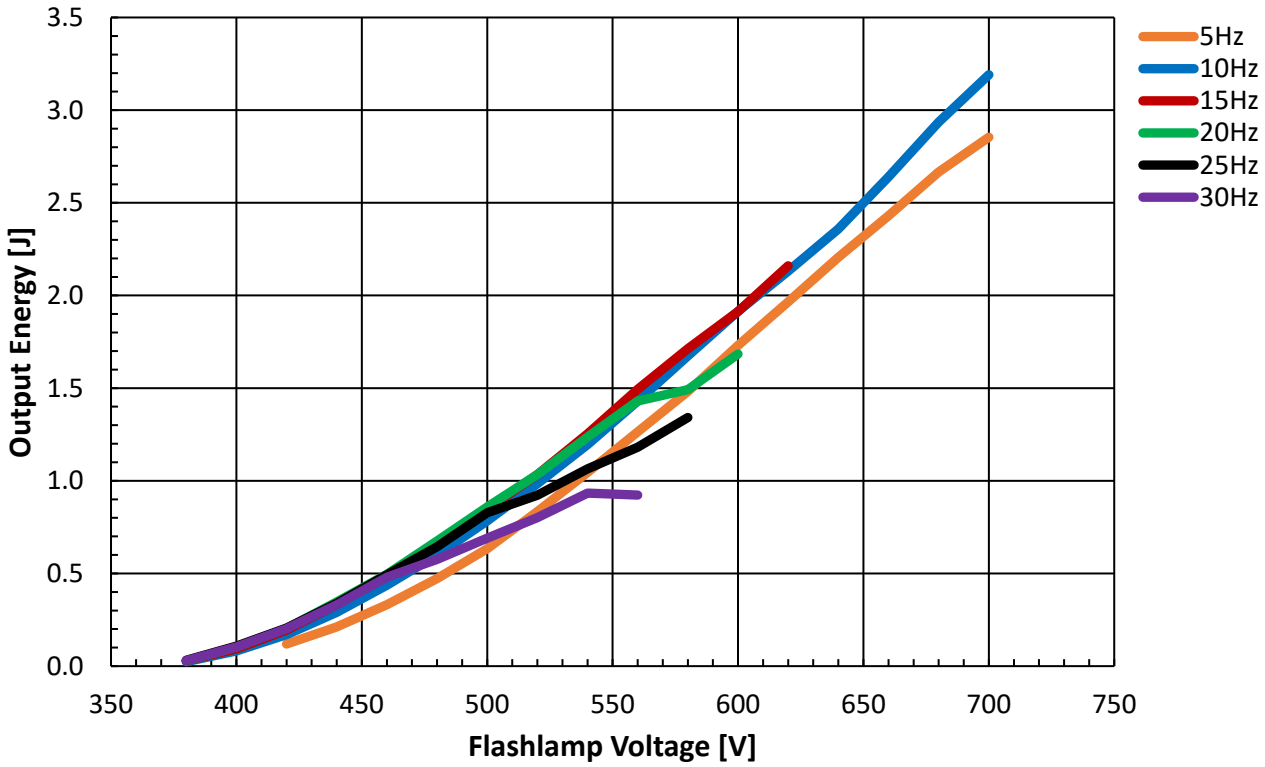
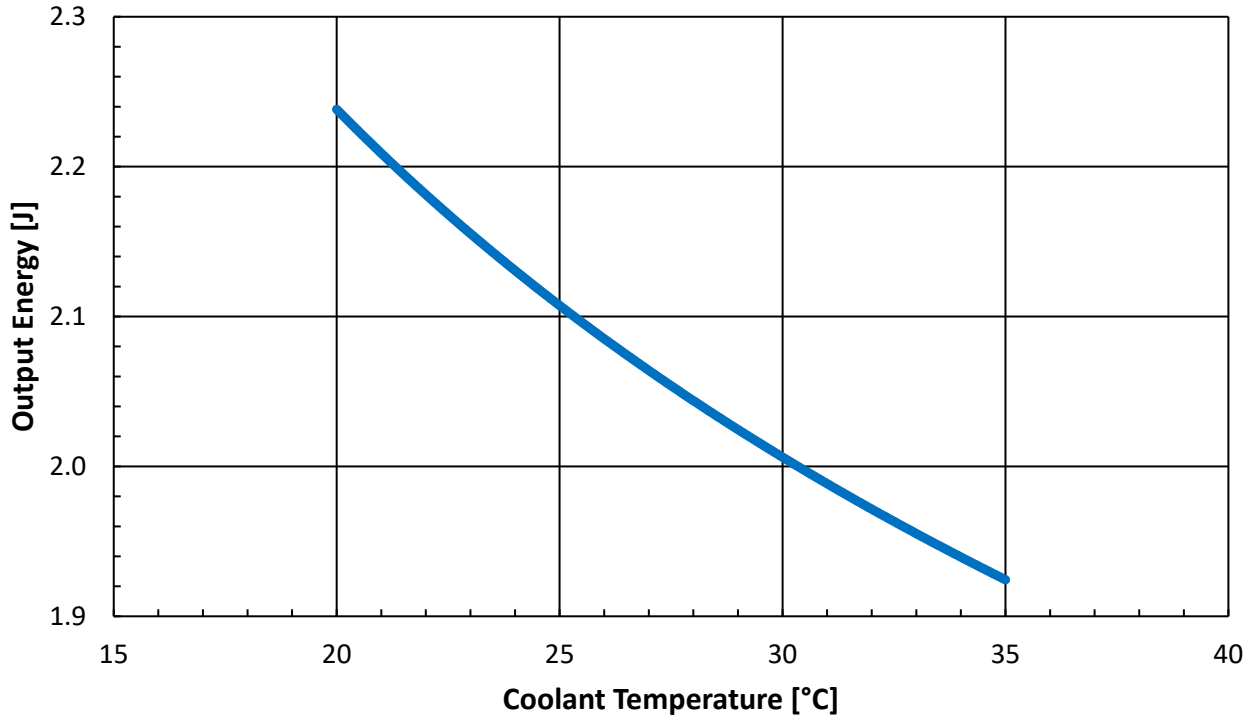
Output Energy Vs. Flashlamp Voltage
Er:YAG 4X100, 350 µs, 82%R OC



Output Energy Vs. Coolant Temperature
Er:YAG 4X100, 350 µs, 10 Hz, 82%R OC, 8 l/min



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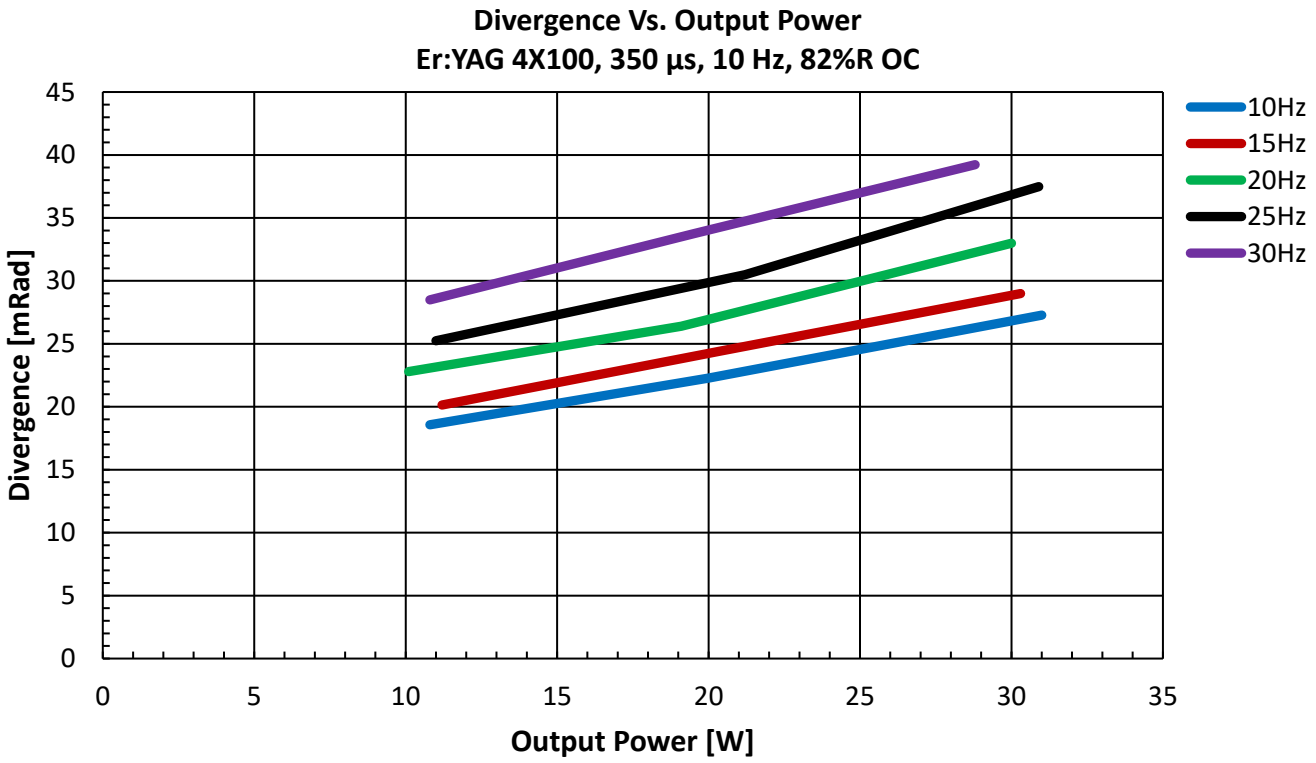
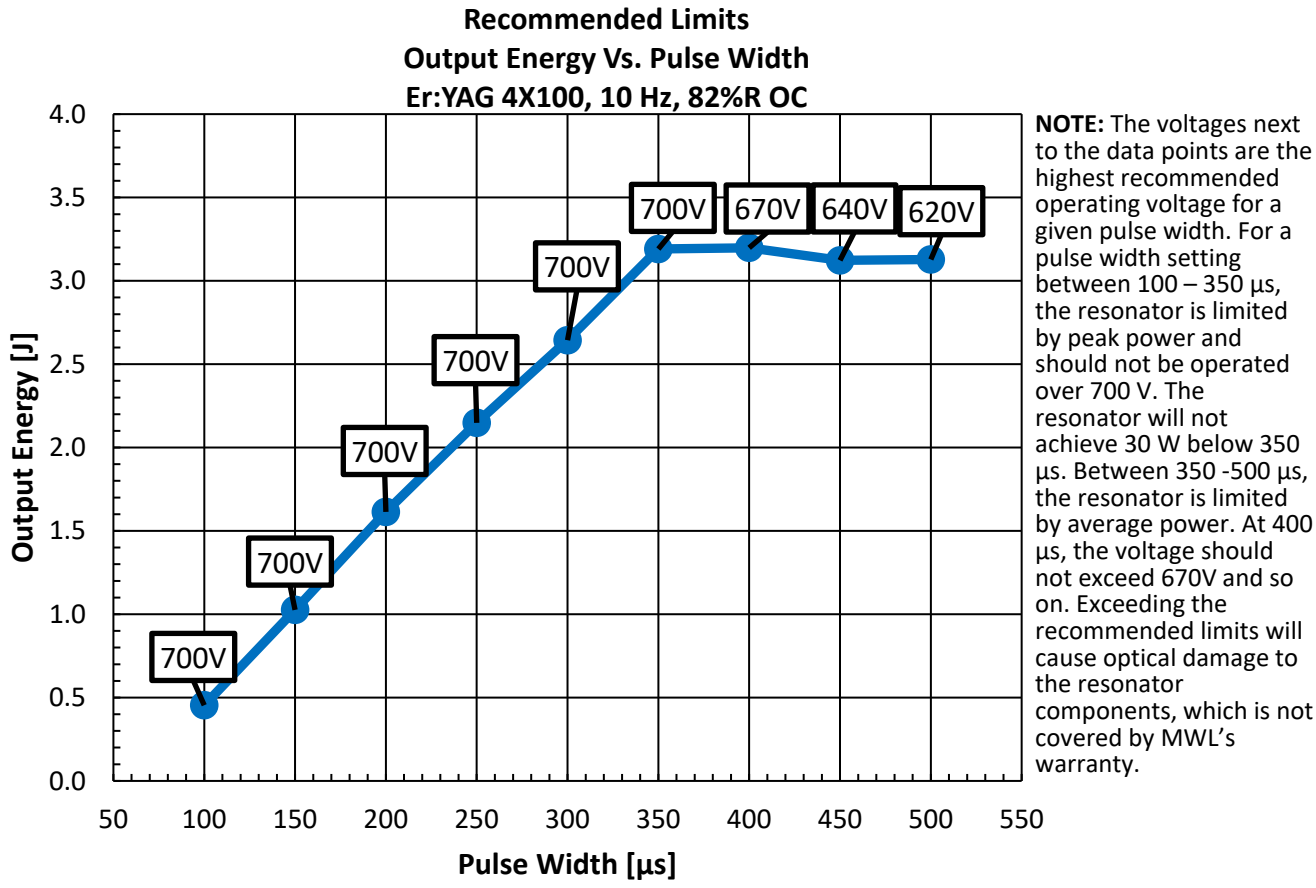




NOTE: The voltages next to the data points are the highest recommended operating voltage for a given pulse width. For a pulse width setting between 100 – 350 µs, the resonator is limited by peak power and should not be operated over 700 V. The resonator will not achieve 30 W below 350 µs. Between 350 -500 µs, the resonator is limited by average power. At 400 µs, the voltage should not exceed 670V and so on. Exceeding the recommended limits will cause optical damage to the resonator components, which is not covered by MWL's warranty.

Recommended Cooling Specifications and Requirements:

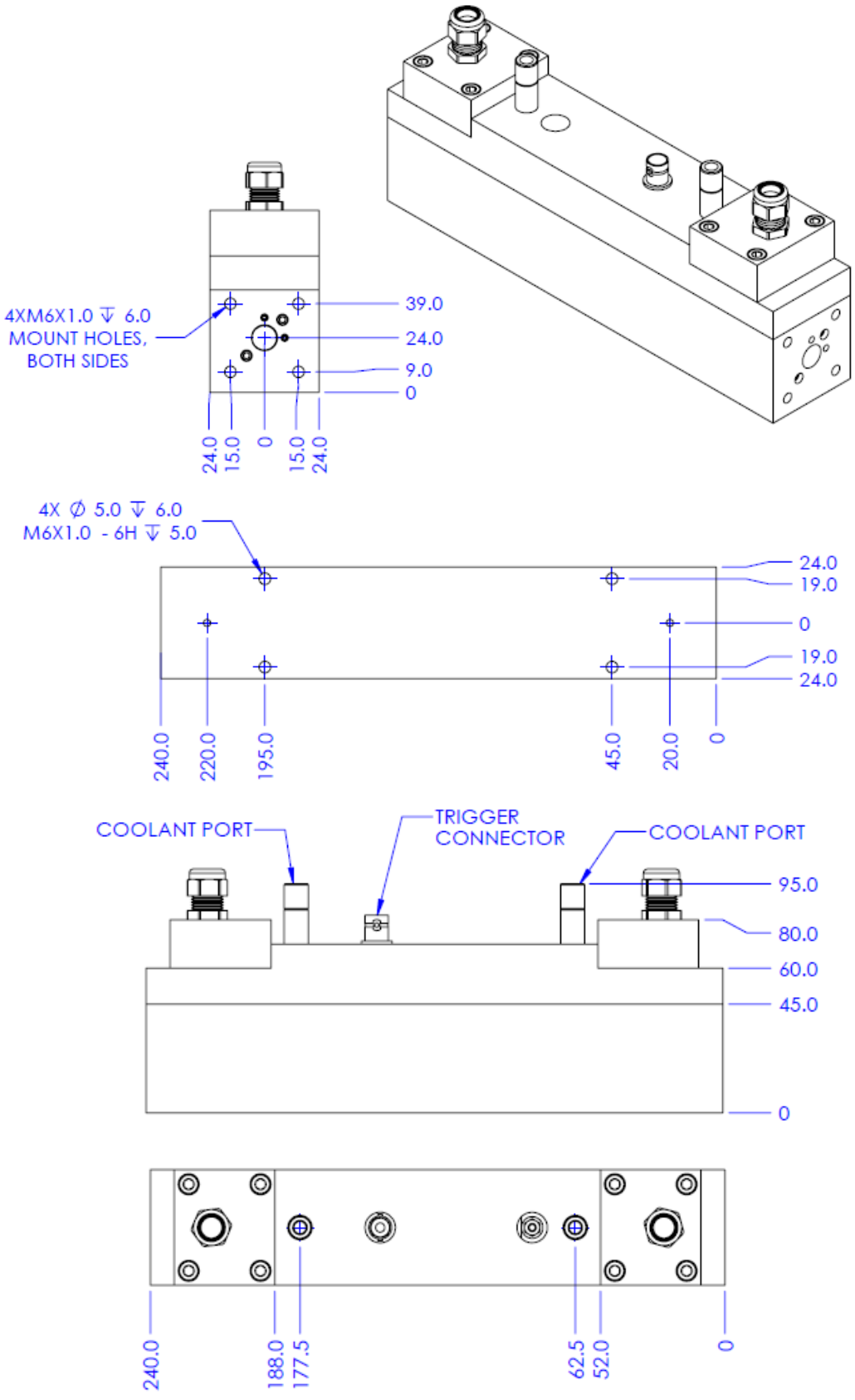
MegaWatt Lasers, Inc. recommends the use of a minimum of 1 kW cooling, at minimum of 8 liters/min (~2 gal/min). Careful selection of wetted cooling system components is very important for long pump chamber life. The pump chamber requires clean deionized water as a coolant. The resistivity should be about 1 MΩ·cm (conductivity ~ 1 S/cm) and should be free of organic contamination. High quality stainless steel, such as 316-L is acceptable, but parts should be passivated. Aluminum must be anodized with a high quality process, such as MIL-A-8625F, Type II, Class 1. Titanium is also acceptable and Grade 2 (unalloyed, standard oxygen) has been used successfully. Copper and copper alloys, such as brass, should be avoided. Many plastics, including polypropylene, polyethylene, Teflon, Delrin, Noryl, etc. have been used successfully, but it is important that these materials do not leach plasticizers into the coolant. Wetted materials that are rated for milk transport are often good candidates for cooling system components. When considering cooling components, it is important to ensure the components do not introduce contamination into the coolant. This is different from the components being "compatible with distilled or deionized water." Ordinary Steam Distilled Water, available from grocery stores usually has a resistivity of 0. 6- 1.2 MΩ·cm and this is acceptable coolant if laboratory distilled or deionized water is not available. If all wetted components are inert, it is generally not necessary to use a deionization filter in the cooling system. If a deionization filter is used, ensure it does not introduce organic contamination into the coolant. The UV from the flashlamp will sterilize biological organisms in the coolant. If the system will not be operated for more than a month, the cooling system should be drained and dried using filtered compressed air or Ultra High Purity (UHP) nitrogen. For a system that is used weekly, the coolant should be changed every six months. Wetted components in the pump chamber include anodized 6061-T6 aluminum, passivated SS 316-L, silicate glass or fused silica, and silicone O-rings.

Flashlamp Driver Recommendations:

For most applications, typical operational parameters are up to 30 Watts of average power at 10 Hz with an electrical pulse duration of 350 microseconds. Using an M184 flashlamp, the capacitor bank voltage is approximately 680 volts. Usually a relatively large capacitor bank (~ 3000uF) is used and the flashlamp current is switched with an IGBT. The resulting current pulse is roughly "square" in shape. A good laboratory driver would be MegaWatt's KALD-20-10.

Resonator Table of replacement components:

Table of Standard replacement components for R4X100C2-ER		
Part #	**Description**	**Notes**
4X100C2	4X100 Pump Chamber with bottom cooling ports	B525-B
C760	Er:YAG laser rod, 4X102 mm	Plano AR coated ends
M184	Flashlamp	Usually In-Stock
C764	HR mirror, ∅ ½ x ¼ in thick	Usually In-Stock
C765	PR mirror, R=82.5%, ∅ ½ x ¼ in thick	Also available 73%


4XM6X1.0 ↧ 6.0
MOUNT HOLES,
BOTH SIDES
39.0
24.0
9.0
0
24.0
15.0
0
15.0
24.0
4X ∅ 5.0 ↧ 6.0
M6X1.0 - 6H ↧ 5.0
24.0
19.0
0
19.0
24.0
240.0
220.0
195.0
45.0
20.0
0
COOLANT PORT
TRIGGER
CONNECTOR
COOLANT PORT
95.0
80.0
60.0
45.0
0
240.0
188.0
177.5
62.5
52.0
0

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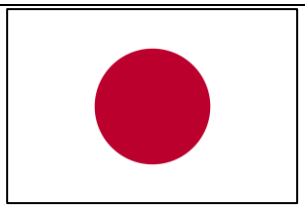

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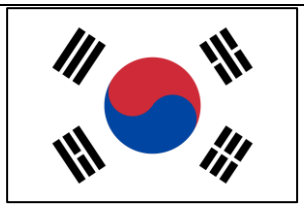

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