

# Custom Product Development A Small Solution

A CO<sub>2</sub> laser is one of the most versatile lasers available today, creating application opportunities in industrial, medical, and laboratory environments. CO<sub>2</sub> lasers are quickly becoming more common across a variety of applications, and the need for ultra-compact lasers that deliver precise results growing even faster. Several Original Equipment Manufacturers (OEMs) challenged Synrad to produce an ultra-compact, low-power CO<sub>2</sub> laser for precision marking on multi-layered materials. For this application, marking would be limited to the surface layer only, avoiding any impact to the underlying layers.

Building a short cavity CO<sub>2</sub> laser for an ultra-compact laser processing subsystem presents a number of challenges. Achieving good mode discrimination is one of the main challenges because short cavity lasers have intrinsic poor mode discrimination. For this particular application, marking precision was a high priority. The

challenge is designing a compact system that would focus the laser beam while increasing the power density to positively impact mode quality optimizing laser marking precision.

Synrad developed the ultra-compact 32-1 high performance CO<sub>2</sub> laser for this application. The 32-1 is 34% smaller and 22% lighter than Synrad's popular 48-1. At a fraction over 11 inches long, only 2.8 inches wide, and weighing 7 pounds, the 32-1 is the smallest all metal, sealed tube CO<sub>2</sub> laser available. A solid performer, the 32-1 has excellent mode quality (M2) at less than 1.2, with a 2.2 mm beam diameter and 5 watts of output power. The ultra-compact 32-1 is just one example of how Synrad delivers custom solutions to meet the needs of our customers.



*The Synrad 32-1 shown side-by-side with the 48-1 laser. The 32-1 is 34% smaller and 22% lighter than the 48-1, making it the most compact high performance all-metal, sealed tube CO<sub>2</sub> laser available.*

Output Specifications	
Wavelength, $\mu\text{m}$	10.57 - 10.63
Power Output	5W
Power Stability (cold start)	$\pm 15\%$
Beam Diameter, mm (at $1/e^2$ )	$2.5 \pm 0.5$
Rise Time (measured at 1 kHz, 50% duty cycle)	$<150 \mu\text{sec}$
Fall Time (measured at 1 kHz, 50% duty cycle)	$<150 \mu\text{sec}$
Input Specifications	
Power Supply Voltage	30 VDC $\pm$ 2.0 VDC
Power Supply Maximum Current	4.0 A
Cooling Specifications	
Maximum Heat Load	150 Watts
Maximum Tube Temperature	60° C
Environmental Specifications	
Operating Ambient Temperature Range	5° C - 40° C
Humidity	$\leq 80\%$ RH, non-condensing
Physical Specifications	
Length	11.2 in. (284 mm)
Width	2.8 in. (71 mm)
Height	4.2 in. (106 mm)
Weight	7 lbs. (3.18 kg)

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