

AN-SL2002-02

65W TO-CAN EEL Evaluation Board

Introduction

This Application Note contains the evaluation board description with specifications, board pictures, schematics and layout of the printed circuit board, bill-of-materials, and performance data for the SLE2002-E01, which is a 65W Evaluation Board using Silanna Semiconductor's SL2002A laser driver IC. The typical performance data is shown along with pictures from the SL200X GUI for V_{in} of 5V. For more specific information about the component placement and board layout guidelines, please refer to AN-SL2001-05.

Evaluation Board Description

This Application Note describes a simple and low cost 65W peak power and 50ns FWHM resonant flash TOF laser system with input of 5V designed primarily for rangefinder applications. The design uses SL2002A (Integrated Resonant Mode Laser Diode Drive System). The Evaluation Board shows how the rangefinder firing module design becomes simple with significantly less number of components on the board due to the high level of integration of the SL2002 controller.

Specifications

Table 1 shows the key specs for the 65W Evaluation Board for SL2002.

Parameter	Value	Unit
Input Voltage	5	V
Peak Power (max)	65	W
Laser FWHM Pulse Width	50	ns
System No Load Power Consumption	< 5	mW
Rep Rate Switching Frequency	1	MHz

Table1: Key Specs

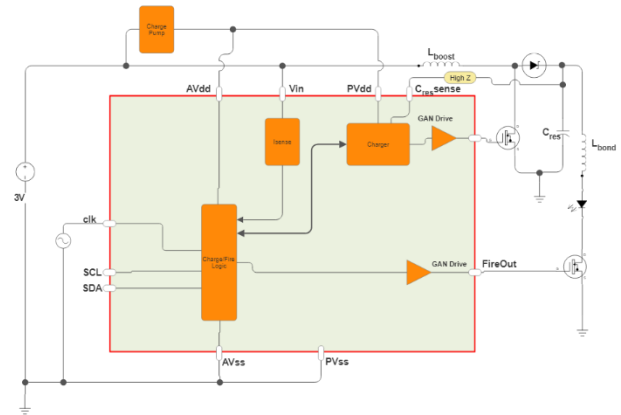


Figure1. Typical Application Diagram (Note: This Evaluation Board does not include a Charge Pump since it is expected to work from a fixed 5V input)

SL2002 Key Features

- Flexible architecture can provide laser FWHM pulses less than 2ns
- High charging efficiency from a single 2.8V to 6V
- Integrates needed blocks for Charging and Firing Resonant-Mode Diode Lasers
- Inductor Current Control offers precise Resonant Capacitor Energy even with Input Voltage Fluctuations
- < 5 mW System No Load Power Consumption
- Up to 1 MHz Rep Rate limited by temperature rise in laser and other board components
- Minimal external components enable extremely integrated and efficient layout
- Integrated I2C interface and non-volatile memory for Output Power Control and Fault monitoring
- 1 mm x 3.5 mm WLCSP Package utilizing bumped die

Applications

- Laser TOF Measurement Systems
- Range Finding
- 3D Mapping

Safety Warning

This device is capable of driving laser diodes to generate high power optical pulses. Such pulses are capable of causing PERMANENT VISION DAMAGE AND BLINDNESS as well as additional injury or property damage. Laser diodes emit light that may be outside of the users' visual range which can cause PERMANENT VISION DAMAGE AND BLINDNESS as well as additional injury or property damage. Users are fully responsible for following proper laser safety procedures to prevent injury or damage. We recommend the use of Laser Eye Safety Goggles for all testing.

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Board Pictures

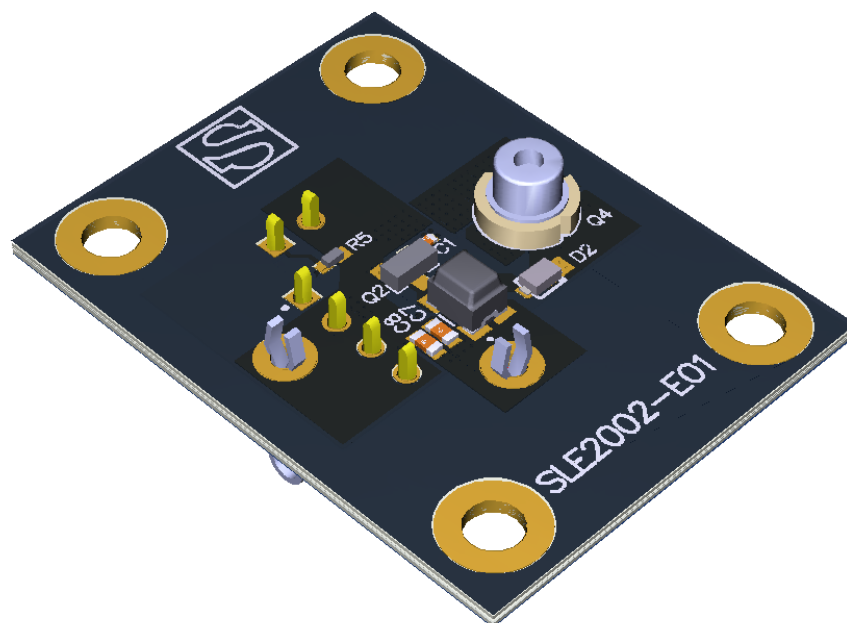


Figure 2. 3-D Picture of the Board

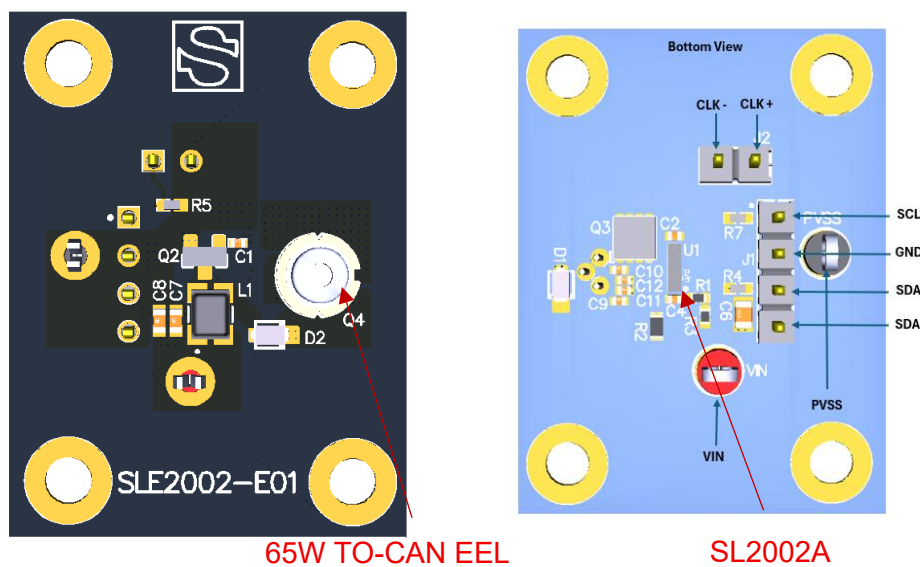


Figure 3. Top and Bottom View

Schematics and Layout

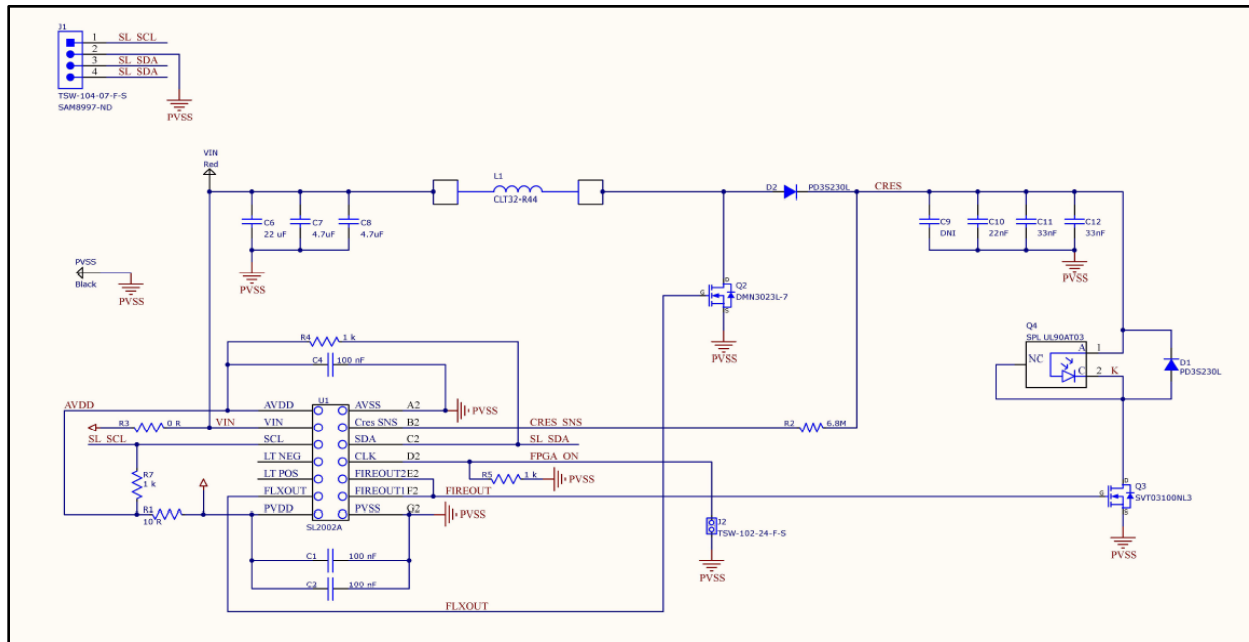


Figure 4: Schematics of the Customer Board

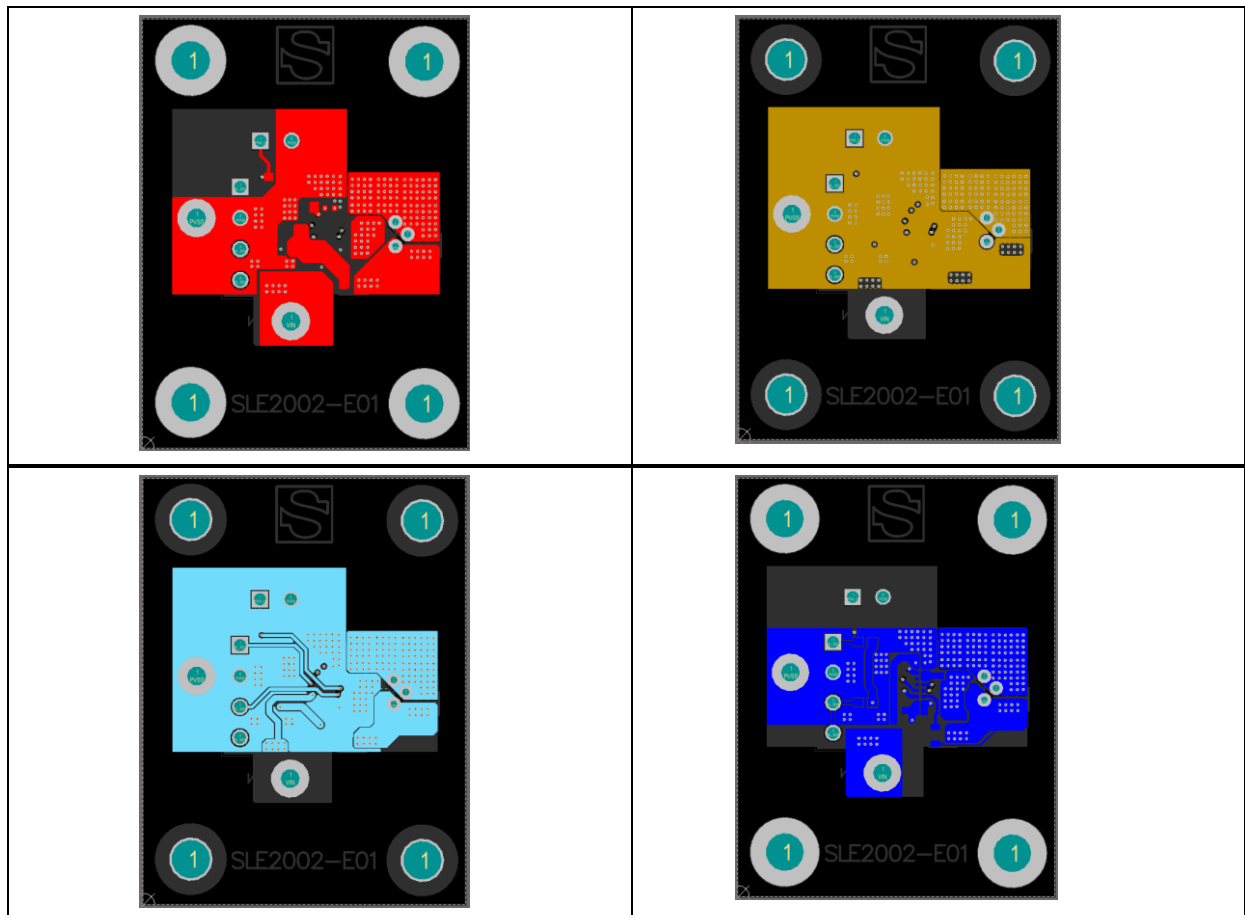


Figure 5: Layout of the Customer Board (4-layers)

Bill of Materials (BOM)

SLE2002-E01 Bill of Materials				
Designator	Comment	Description	Manufacturer Part Number	Manufacturer
C1, C2, C4	100 nF	CAP CER 0.1UF 50V X7R 0402	C1005X7R1H104K050BB	TDK
C6	22 uF	CAP CER 22UF 35V X5R 0805	C2012X5R1V226M125AC	TDK Corporation
C7, C8	4.7uF	CAP CER 4.7UF 35V X5R 0603	GRM188R6YA475KE15D	Murata Electronics
C9	DNI	DO NOT INSTALL	GRM155R71H153KA12J	Murata Electronics
C10	0.022 μ F	CAP CER 0.022UF 50V X7R 0402	GRM155R71H223KA12D	Murata Electronics
C11, C12	0.033 μ F	CAP CER 0.033UF 50V X7R 0402	GRM155R71H333KE14J	Murata Electronics
D1, D2	PD3S230L	DIODE SCHOTTK 30V 2A POWERDI 323	PD3S230L-7	Diodes Incorporated
J1	TSW-104-07-F-S	CONN HEADER VERT 4POS 2.54MM	TSW-104-07-F-S	Samtec Inc.
J2	TSW-102-24-F-S	CONN HEADER VERT 2POS 2.54MM	TSW-102-24-F-S	Samtec Inc.
L1	CLT32-R44	440 nH Shielded Molded Inductor 10.1 A 7.6mOhm 4-SMD	CLT32-R44	EPCOS - TDK Electronics
PVSS	Black	PC TEST POINT MULTIPURPOSE BLACK	5011	Keystone Electronics
Q2	DMN3023L-7	MOSFET N-CH 30V 6.2A SOT23	DMN3023L-7	Diodes Incorporated
Q3	SVT03100NL3	LVMOSFET NCH 30V 45A Single	SVT03100NL3	Silan
Q4	SPL UL90AT03	METAL CAN TO56 - PULSED LASER DIODE	SPL UL90AT03	ams-OSRAM USA INC.
R1	10 R	RES 10 OHM 1% 1/16W 0402	RC0402FR-1310RL	Yageo
R2	6.8M	RES SMD 6.8M OHM 1% 1/10W 0603	CRCW06036M80FKEA	Vishay Dale
R3	0 R	RES 0 OHM JUMPER 1/16W 0402	RC0402JR-070RL	YAGEO
R4, R5, R7	1 k	RES 1K OHM 1% 1/16W 0402	RC0402FR-071KL	Yageo
U1	SL2002A	IC LASER DRIVER TOF 200W 14WCSP	SL2002A	Silanna
VIN	Red	PC TEST POINT MULTIPURPOSE RED	5010	Keystone Electronics

Table 2: Bill of Materials

Test Set-up

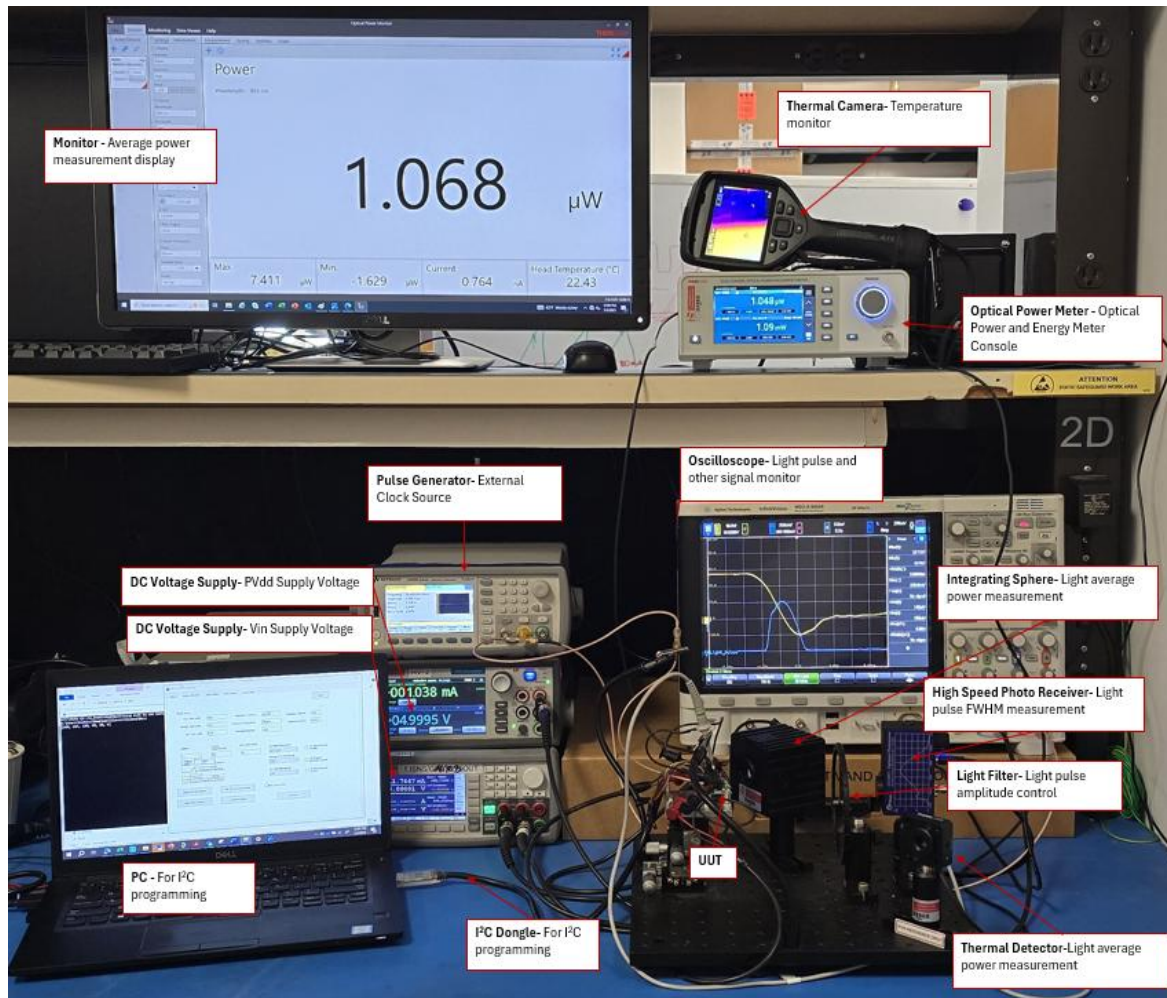


Figure 6. Standard Test Set-up

Equipment	Description/Model/Setting
Oscilloscope	Agilent Technologies MSO-x 6004 Data Acquisition Setting: Averaging 1024 ; 6GHz ; 10.0Gsa/s
Oscilloscope Probe	Agilent N2894A
Optical Power Meter	Thorlabs PM5020
Integrating Sphere	Thorlabs S142C
Optical Receiver	iCHaus iC212NST High-Speed Photo Receiver
Pulse Generator	Keysight 33500B Series Wave Generator
DC Voltage Supply, Vin	Keysight B2912A Precision Source/Measure Unit

Table 3: List of Equipment Used

Performance Data

This section provides details about the GUI settings and the corresponding Test Results from the evaluation board using the default settings. The SL2002A on this evaluation board is preprogrammed with MTP (multi-time programmable) memory. Below is the performance data of the board with the default Timing Setting at different input voltages.

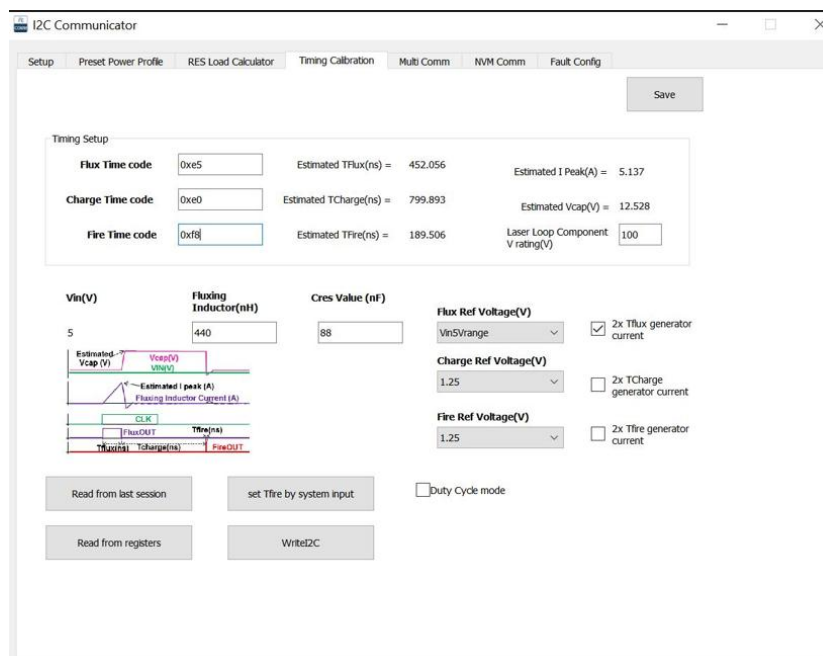


Figure 7: Timing Calibration Initial Readout (Default Timing Setting)

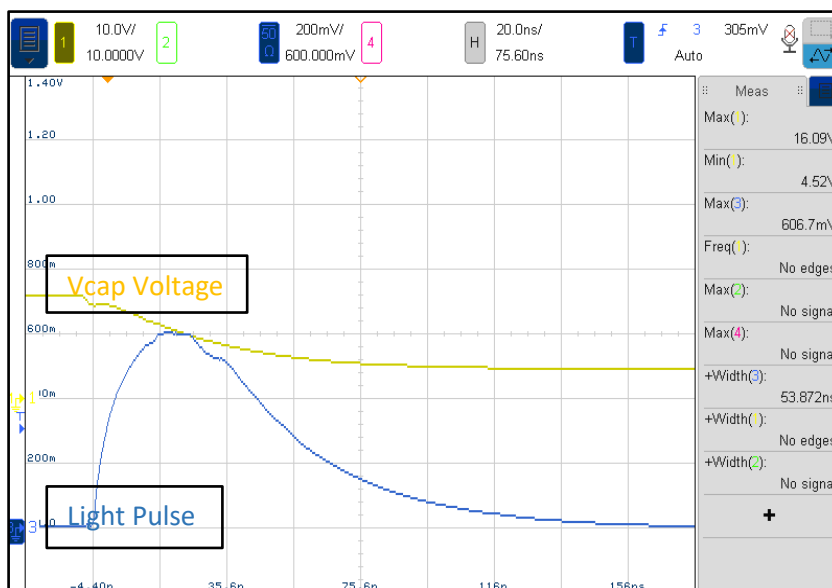


Figure 8: Light waveform with default time setting

Notice that Fire Time code is set to high value (0xf8, estimated 189ns). This allows the light to turn off naturally with the Cres discharge. This can be set to lower value to ensure <50ns light pulse.

Data with the Optimized Setting for 65W Peak Power/ Less than 50ns FWHM Light Pulse

SL2001 GUI can be used to program the settings to achieve 65W Light peak power with <50ns FWHM pulse. Refer to AN-SL2001 (GUI) on how to use the I2C GUI. Below is the optimized data at different Vin conditions.

Test Condition	
Vin	5.00 V
Clock	1KHz
Test Data	
Plight Peak	68.1W
FWHM	45.9 ns

Table 4: Test Data with recommended timings

The screenshot shows the I2C Communicator GUI with the following settings:

- Timing Setup:**
 - Flux Time code: 0xec, Estimated TFlux(ns) = 537.471, Estimated I Peak(A) = 6.108
 - Charge Time code: 0xe0, Estimated TCharge(ns) = 799.893, Estimated Vcap(V) = 14.544
 - Fire Time code: 0xc8, Estimated TFire(ns) = 47.138, Laser Loop Component V rating(V) = 100
- Vin(V):** 5
- Fluxing Inductor(nH):** 440
- Cres Value (nF):** 88
- Flux Ref Voltage(V):** VinSvrange, ☒ 2x TFlux generator current
- Charge Ref Voltage(V):** 1.25, ☐ 2x TCharge generator current
- Fire Ref Voltage(V):** 1.25, ☐ 2x TFire generator current
- Buttons:** Read from last session, Read from registers, set Tfire by system input, WriteDC, ☐ Duty Cycle mode

Figure 9: Recommended Timing Setting (Flux time, Charge Time and Fire Time)

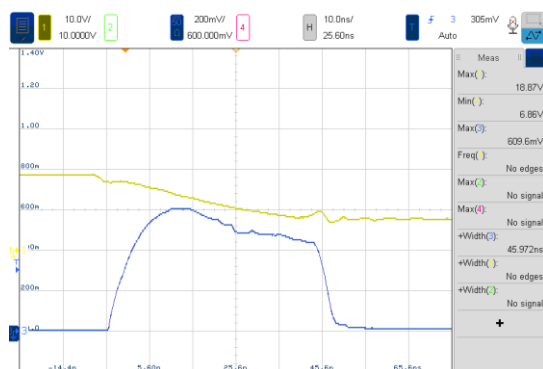


Figure 10: Vcap and Light Pulse Curve

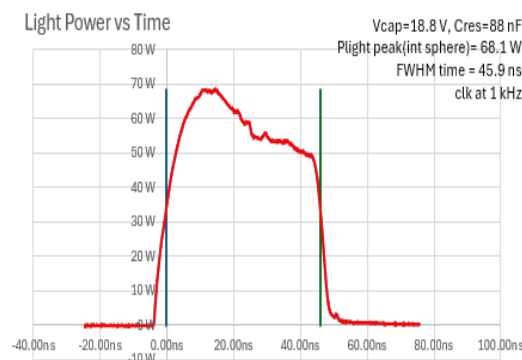


Figure 11: Light Peak Power vs Time Curve

Summary and Conclusions

This application note provides detailed description of the 65W Evaluation Board using SL2002A including the test results for various GUI settings. Silanna's Application and Marketing team would encourage the customers to go through this Application Note and try duplicating at least some of the tests shown here, to ensure the board is functioning properly. This will also familiarize the user with the evaluation board hardware and the GUI software. In case of any questions or concerns, please contact Silanna Semiconductor's Application team (bcabico@silanna.com).

Revision History

Revision	Date	Author	Note
0.1	19 Feb 2026	BC	Draft release.
1.0	8 Mar 2026	BC/ AZ	Updated