ICx Photonics IR Light Source Evaluation Kit

Hardware Version: 1640-3A

Software Version: 2.0

4 Federal Street
Billerica, MA 01821
P: 978-215-0500
F: 978-215-0590
www.icx-photonics.com

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Quick Start Guide

Parts:
Included
1. Driver Board
2. Power Supply
3. Device Cable
4. Software Installation CD

User Supplied
1. Computer with serial port assigned as "Com1"
2. DB9 Serial Cable (M-F)

Setup:
1. Insert CD in computer and follow installation instructions
2. Connect serial cable between PC's Serial Port and U1 on Driver Board
3. Connect power supply to Driver Board Socket and A/C Outlet
4. Connect device cable to "J3"
5. Insert Device in socket

Software Operation:
1. Select light source type
2. Update default resistance with measured value
3. Select desired operation mode [Constant or pulsed]
   a. If pulsed then select frequency and duty cycle
4. Select desired drive amplitude
5. press START
   a. Observe LED on Driver Board flashing synchronous with light source.
6. Press STOP and update settings as needed, then START

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Hardware Connections:

Caution – The board is not enclosed in a housing, nor does it have standoffs, so be sure not to place it on a conductive surface as that may cause shorting of the board's circuitry.
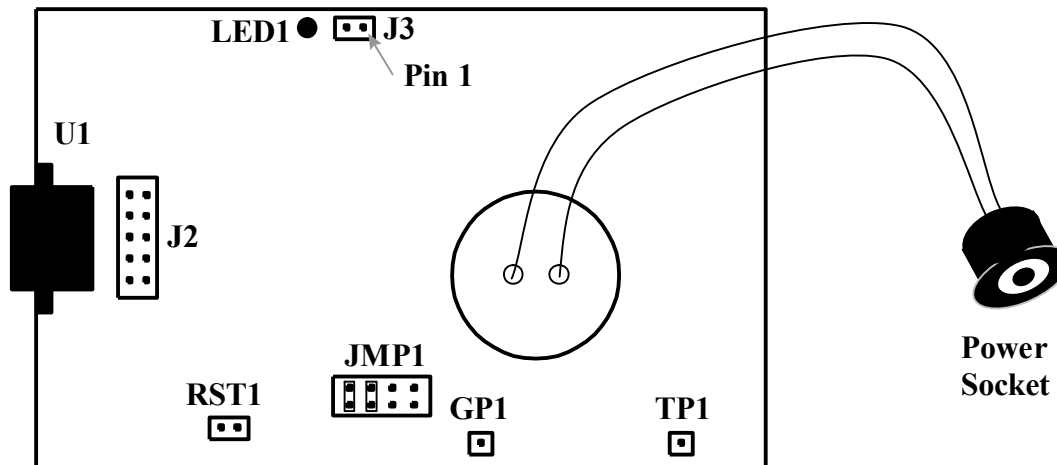

Figure 1 – *Board Connection Diagram*

Power Socket – Power input connector for the power module (supplied). Input voltage is 6 VDC at 1.25 Amps with the central pin having positive polarity.

J3 – Connection for the leads to the IR light source (not sensitive to polarity).

LED1 – Will pulse synchronous with output to the device.

U1 – Receptacle for the DB9 communication cable.

JMP1 – Placing jumpers across these pin pairs will cause the board to boot using pre-defined parameter sets and initiate pulsing without computer control. The table shown in the Manual Operation section of this document enumerates these parameter sets. Commands sent from the software will override these settings until the next reset occurs.

RST1 – Shorting these pins together will reset the board's logic. If jumpers are present in JMP1, then these settings will be implemented and pulsing commenced. If no jumpers are present, then the board will await parameters from the PC software.

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TP1 – On this pin the board outputs a waveform synchronous with power delivered to the device. This is handy for viewing waveform on an oscilloscope or for synchronous triggering of a detection circuit. For triggering a lock-in detection system with phase delay, the timing of this signal may be phase delayed from the pulsing of the light source using the "D" command described in "Writing Your Own Communication Code" later in this document.

GP1 – A ground connection used when monitoring TP1.

Software Settings:

Device Settings – The evaluation kit software computes the current to be delivered to the IR light source based on the type of device and its resistance. Thus it is important to accurately select the "Product Family" and "Resistance" so as to not substantially over- or under-power your light source.

Select the device type that you will be operating from the pull down list "Product Family". The options presented represent the various package formats for our light source products regardless of window. A complete list of our products and their associated Families is presented in Appendix A.

Your "Product Family" selection will auto-populate the "Resistance" field with a nominal value for the device under test. While this should be close to the device's actual value, optimal performance will be achieved by inputting the actual measured value for your particular device. For small sample quantities the resistance value will be written on the device or its package as part of our outgoing inspection.

Timing Settings – The evaluation software enables both constant and pulsed operation. Simply click on the software's toggle switch to select which operating mode you would like to evaluate.

If "pulsed" mode is selected, then fields for "Frequency" and "Duty Cycle" will be visible. Frequency is the repetition rate of the pulsing (in seconds), and Duty Cycle refers to the fraction of each cycle for which the light source receives power. For example a 1 Hz, 50% setting will provide a pulse with ½ second duration which occurs once a second.

Power Settings – Having selected the "Product Family" and device "Resistance" in the "Device Settings" window the software is equipped to compute the rated power for your device. The "Drive Level" dial (and text input window) enable you to select a percentage of the rated power which you would like delivered to your device. Thus a setting of 100 will deliver the power level stated in our product literature for the light source you are evaluating. Values above 100% are permitted so that you may explore the higher output of the device. Most devices will not immediately fail (open circuit) when operated above the recommended 100% level, however prolonged operation above 100% will accelerate aging of the device.

The "Inrush" toggle provides a brief (10 mSec) and intense (2 Amp) warming current to the light source at the beginning of each pulse. This is intended to speed the warm-up part of the pulse cycle for applications where speed of pulse onset is important.

Operation Controls – Clicking the "Start" button will initiate pulsing according to the settings selected. Once pulsing is underway, this button's function (and label) will change to "Stop". Clicking "Stop" will cease pulsing and allow modification of pulse parameters. This may be done innumerable times.

Clicking the "Stop Program" button will cause the board to cease pulsing and the software will stop running. Software operation may be restarted with the white button at the top left corner of the software's window, or by closing the window and reinitializing from the Windows START menu.

During operation, the software performs a communication handshake with the electronic board. If the software does not receive the proper response from the board, then a "Communication Error" indicator will appear in the lower part of the "Operation Controls" window. Most often this message is received because the board is not powered, the serial cable is improperly installed, or the PCs port settings are not configured properly.

Device Output – The software will compute an approximate filament temperature based on the Device and Power settings selected and adjust the thermometer display accordingly.

The "Waveform" indicator will display a picture of the type of waveform being delivered to the light source. This is a simple indication of whether power delivered to the light source is constant, pulsed, or includes an inrush pulse. This picture does not reflect the amplitude or timing adjustments made in the software.

The numerical displays indicate the current delivered to the device in the "Peak" (Inrush) or "Sustain" portions of the pulses.

There are some device and power setting combinations which exceed the capabilities of the drive electronics. When this occurs the software will decrease the power to the maximum possible level (1.25 Amps) and will display a "Limited" indicator in this display box.

Manual (Jumper) Operation:
The Evaluation Board may be operated without the PC by using the pre-loaded pulse parameters. These may be selected by placing jumpers on JMP1 (shown in Figure 1) according to Table 1 below. If a jumper(s) is(are) in place when the board first receives power (or RST is shorted momentarily), then these settings are loaded into the waveform and the board will initiate pulsing the IR light source (as evidenced by the flashing LED). If the jumpers are not present, then the board will await commands from the PC. PC commands will override jumper control until power or RST reset occurs again.

Table 1 – *Jumper settings for non-PC controlled operation (as viewed with board orientation as shown in Figure 1)*

JMP1	Current	Frequency	Duty Cycle
⦿	Under PC Control		
⦿	0.8 A	1 Hz	50%
⦿	1.0 A	1 Hz	50%
⦿	0.24 A	15 Hz	70%
⦿	0.8 A	DC	100%
⦿	0.24 A	15 Hz	50%
⦿	0.24 A	10 Hz	70%

Writing Your Own Communication Code:

Communicating with the Evaluation board with your own software is quite straightforward. Essentially you send a setup string which defines the waveform to be delivered, and then transmit an execute command which will cause the board to pulse repeatedly until power interruption or receipt of a termination command (any character received during pulsing will be interpreted as a termination command). The waveform parameters may be transmitted to the board in any order and will be retained in memory until power is interrupted, RST is shorted, or a replacement value is received. Figure 2 shows a diagram of a generic waveform and indicates the identifier used to control each part of the waveform while Table 2 shows the values and ranges for each.
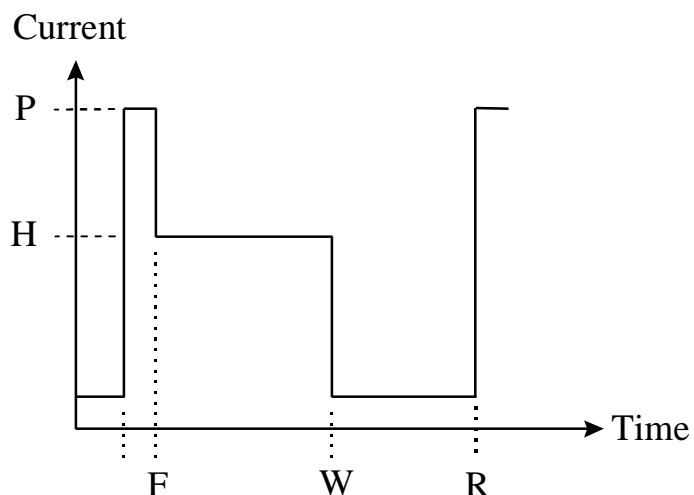
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Figure 2 – Pulse *Waveform and the parameters used to describe it when communicating directly with the driver board.*

Table 2 – *Parameters used to describe the waveform when communicating with the driver board*

Wave Part	Identifier	Minimum (Counts)	Maximum (Counts)	Multiplier (1 count =?)	Comment
Inrush Height	P	5	153	19.6 mA	Kit set to 2.0 Amps
Inrush Duration	F	2	36	1/1800 Sec	Kit set to 10 mSec
Pulse Height	H	5	64	19.6 mA	Not including pre-pulse
Pulse Duration	W	18	63,999	1/1800 Sec	On-time of 1 pulse
Target Voltage	V	0	152	39.06 mV	Voltage compliance limit for current pulse
Phase Delay	D	0		1/1800 Sec	Delay between pulse and TP1 output
Wave Period	R	0	63,999	1/1800 Sec	Time between pulses (start-start)

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Communication Setup – Communication may be performed with a terminal program such as HyperTerminal or may be coded directly into your system software. The communication port must be Com1 and be configured as:

* Baud rate = 9600 bits/second
* Data bits = 8
* Parity = None
* Stop Bits = 1
* Flow control= None
* Emulation = ANSI

For your convenience we have included a HyperTerminal configuration file with your evaluation kit software.

Command syntax – Each command consists of the Identifying letter (Caps) followed by the desired value in counts, and finally a carriage return (e.g. P105[cr]). Upon receiving and understanding each command, the board will echo the command. A command which the board cannot interpret will receive a "?" response. The various waveform commands may be transmitted in any order. If after pulsing the board, you transmit a new value for one of the parameters, it is not necessary to re-transmit the other, unchanged parameters.

Additional Commands – The following commands will also elicit a response from the board.

* "G" – Initiate pulsing using the parameters already received.

* "I" – Report firmware version.

* "S" – Stop pulsing, retain pulse parameters, await restart or parameter modification. [Any character (including noise spikes) received during pulse operation will have the same affect]

* For constant (or DC) waveform set R and W to the same value.

Programming Example 1 – DC, 0.8Amp

P41[cr] F2[cr] H41[cr] W180[cr] R180[cr] G

Programming Example 2 – 1 Hz, 50% Duty, 0.7A pulse, Inrush=10 mSec @ 2A

P102[cr] F18[cr] H36[cr] W900[cr] R1800[cr] G

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Appendix A – Product Families

Family	Part Number	Description
PulsIR - T05	NL5LNC	m-shaped filament, T0-5 package, No window
	NL5NCC	m-shaped filament, T0-5 package, CaF_2 window
	NL5NGC	m-shaped filament, T0-5 package, Ge window
	NM5NSC	m-shaped filament, T0-5 package, Sapphire window
PulsIR - T08	NL8ACC	m-shaped filament, T0-8 package, CaF_2 window
	NL8LNC	m-shaped filament, T0-8 package, No window
	NM8ASC	m-shaped filament, T0-8 package, Sapphire window
PulsIR - T046	NL46LNX	1 Strip filament, T0-46 package, No window
Multi-Element	NL82LNC	2 Strip filaments, T08-600 package, No window
	NL84LNC	4 Strip filaments, T08-600 package, No window
	NL84NGC	4 Strip filaments, T08-600 package, Ge window
	NM82ASC	2 Strip filaments, T08-600 package, Sapphire window
	NM84ASC	4 Strip filaments, T08-600 package, Sapphire window
ReflectIR	ReflectIR-P1C	Helical filament, Parabolic reflector, CaF_2 window
	ReflectIR-P1N	Helical filament, Parabolic reflector, No window
	ReflectIR-P1S	Helical filament, Parabolic reflector, Sapphire window

Note: In the event that you have a custom light source, please refer to the spec sheet provided with that source.