OPTO-1
Peripheral Board
Technical Manual

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WARRANTY:

BiPOM Electronics warrants OPTO-1 for a period of 1 year. If the board becomes defective during this period, BiPOM will at its option, replace or repair the board. This warranty is voided if the product is subjected to physical abuse or operated outside stated electrical limits. BiPOM Electronics will not be responsible for damage to any external devices connected to OPTO-1. BiPOM Electronics disclaims all warranties express or implied warranties of merchantability and fitness for a particular purpose. In no event shall BiPOM Electronics be liable for any indirect, special, incidental or consequential damages in connection with or arising from the use of this product. BiPOM Electronics' liability is limited to the purchase price of this product.

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1. Overview

OPTO-1 is a peripheral opto-isolated input board for the MINI-MAX and PRO-MAX series of micro-controller systems.

OPTO-1 has 8 opto-isolated input channels with 10 KHz Frequency Response and one channel with high speed-10 MBit/s logic gate optocoupler.

OPTO-1 is powered from 5 Volts DC of external power source through the 20-pin expansion connector.

Software examples for OPTO-1 Peripheral board are available from http://www.bipom.com/

2. Specifications

OPTO-1 board has the following configuration:

- 8 channels of PC847X optoisolators with 10 KHz Frequency Response.

  Optionally AC input PC844X optoisolators can be used instead of PC847X.
- 1 channel with high speed-10 MBit/s logic gate 6N137 optocoupler
- 16-pin terminal block for 8 low speed inputs

  With a using of PC847X

  maximum forward voltage value is 20V,

  maximum reverse voltage value is 6V.

  With a using of PC844X

  maximum input voltage value is ±20V.
- 2-pin terminal for high speed input (logic level voltages)
- Configuration of low speed inputs via 17 jumpers
- Configuration of the high speed input via 3 jumpers
- 20-pin Expansion connector and 10-pin connector for a host micro-controller board (http://www.bipom.com/boards51.php)
- Single operating voltage: 5 VDC
- Dimensions are 2.35 X 2.40 inches (5.97 X 6.10 centimeters).
- Mounting holes of 0.138 inches (3.5 millimeters) are on four corners.
- 0° - 70° C operating, -40° - +85° C storage temperature range.

3. Functional Blocks

Figure 1 shows the block diagram of the OPTO-1 system

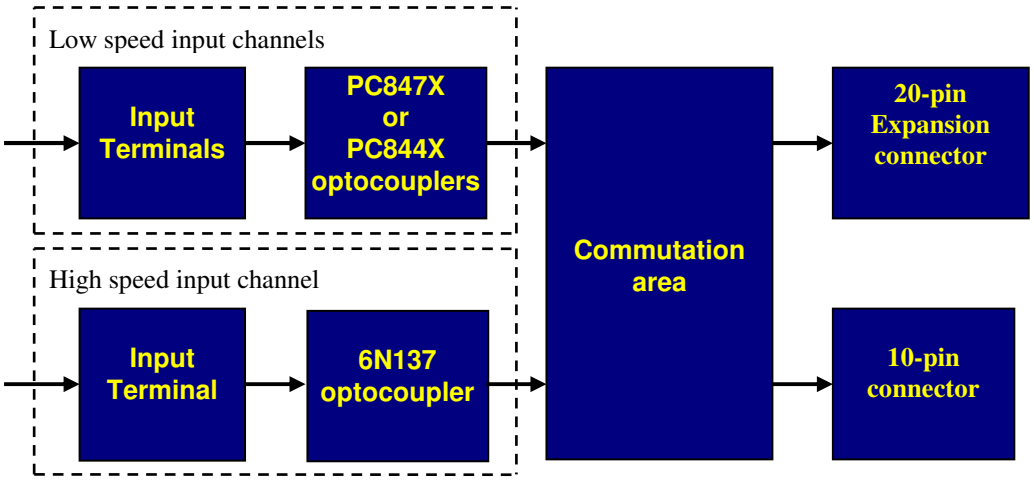


Figure 1

Expansion connector

The 16 control pins and 5 Volt power supply pins are available on the 20-pin connector (J1) for interfacing to micro-controller boards. OPTO-1 can be connected to micro-controller board either as a piggyback daughter-board using standoffs or can be placed away from the micro-controller board using a 20-wire ribbon cable (Part #: EXPCABLE-6). Table 1 shows the pin assignments for the connector.

Connector J1

Signal	Pin	Pin	Signal
P3.0	20	19	P3.1
P3.2	18	17	P3.3
P3.4	16	15	P3.5
P3.6	14	13	P3.7
P1.0	12	11	P1.1
P1.2	10	9	P1.3
P1.4	8	7	P1.5
P1.6	6	5	P1.7
VCC (+5V)	4	3	GND
VCC (+5V)	2	1	GND

Table 1

Secondary Expansion connector

This connector can also be used as 8-pin port for a communication 8 input optocoupled signals with a host micro-controller board. On MINI-MAX series boards, this is typically the keypad connector.

Table 2 shows the pin assignments for the connector.

Connector J2

Name	Signal	Pin
VCC	+5V	10
GND	Ground	9
P2.7	X8	8
P2.6	X7	7
P2.5	X6	6
P2.4	X5	5
P2.3	X4	4
P2.2	X3	3
P2.1	X2	2
P2.0	X1	1

Table 2

Input Terminals

Table 3 shows the pin assignments for the input terminals

Input Port Terminals X1 … X9

Name	Signal	Pin
I0	Input I0 (+Vx0)	X1-1
C0	Input C0 (-Vx0)	X1-2
I1	Input I1 (+Vx1)	X2-1
C1	Input C1 (-Vx1)	X2-2
I2	Input I2 (+Vx2)	X3-1
C2	Input C2 (-Vx2)	X3-2
I3	Input I3 (+Vx3)	X4-1
C3	Input C3 (-Vx3)	X4-2
I4	Input I4 (+Vx4)	X5-1
C4	Input C4 (-Vx4)	X5-2
I5	Input I5 (+Vx5)	X6-1
C5	Input C5 (-Vx5)	X6-2
I6	Input I6 (+Vx6)	X7-1
C6	Input C6 (-Vx6)	X7-2
I7	Input I7 (+Vx7)	X8-1
C7	Input C7 (-Vx7)	X8-2
HSI	High Speed Input (+Vx)	X9-1
HSC	High Speed Input (-Vx)	X9-2

Table 3

Configuration Jumpers

Table 4 shows the signal connections for the jumpers:

Name	Signal	Circuit	Notes
HSI	High Speed Input (+Vx)	6N137 optocoupler output	Uses w/o 6N137 optocoupler
HSC	High Speed Input (-Vx)	GND	Uses w/o 6N137 optocoupler
HS1.4	6N137 buffered output	Net P1.4 on J1:08	Do not install if 1.4 is used!
1.0	Buffered Input 0	Net P1.0 on J1:12	
2.0	"	Net P2.0 on J2:01	
1.1	Buffered Input 1	Net P1.1 on J1:11	
2.1	"	Net P2.1 on J2:02	
1.2	Buffered Input 2	Net P1.2 on J1:10	
2.2	"	Net P2.2 on J2:03	
1.3	Buffered Input 3	Net P1.3 on J1:09	
2.3	"	Net P2.3 on J2:04	
1.4	Buffered Input 4	Net P1.4 on J1:08	Do not install if HS1.4 is used!
2.4	"	Net P2.4 on J2:05	
1.5	Buffered Input 5	Net P1.5 on J1:07	
2.5	"	Net P2.5 on J2:06	
1.6	Buffered Input 6	Net P1.6 on J1:06	
2.6	"	Net P2.6 on J2:07	
1.7	Buffered Input 7	Net P1.7 on J1:05	
2/7	"	Net P2.7 on J2:08	

Table 4

Power Supply

External power supply should be able to supply 5 Volts DC at a minimum of 50mA current

WARNING: Correct polarity should be observed when applying external DC supply to Expansion connector.

4. Application Notes

OPTO-1 board can either be stacked on top of MINI-MAX/51-C using stand-offs or connected in a chain configuration using flat ribbon cable. Figure 2 shows how OPTO-1 can be connected to a Micro-Computer board in a stacked fashion. Figure 3 shows chain connection (without using cable for additional 10-pin connector J2).

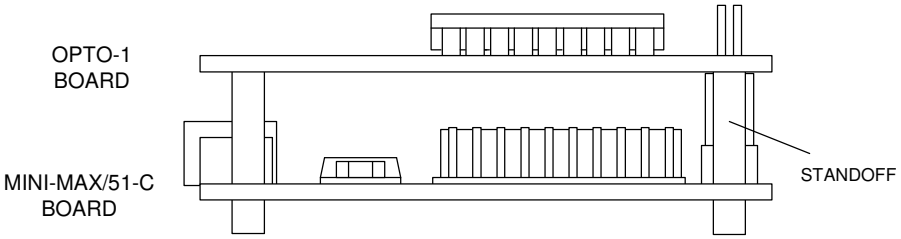


Figure 2

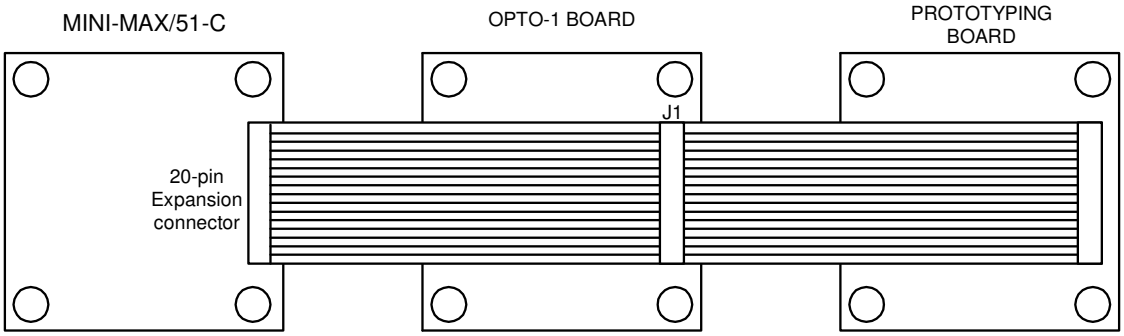


Figure 3

More details concernig BiPOM Peripheral boards are available from the link below:
http://www.bipom.com/periph_boards.php

8051/52, BASCOM51 and SDCC (Small Device C Compiler) development systems provide examples for OPTO-1.

Please download any of these development systems from:

http://www.bipom.com/software.php

Figure 4 shows connection OPTO-1 board to external circuitry.

WARNING! Correct polarity should be observed when applying external circuitry to input terminals.

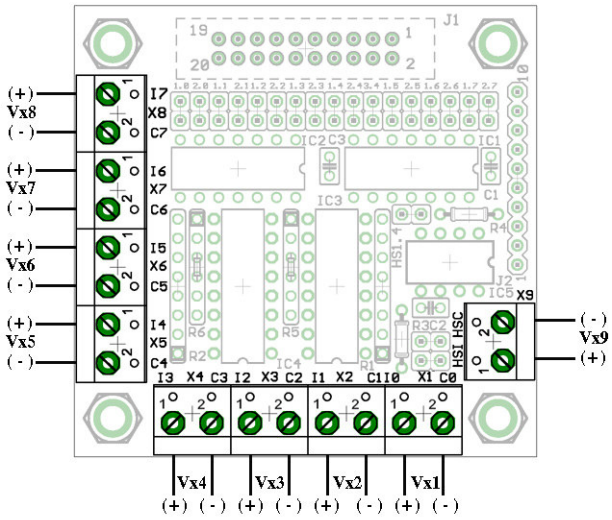


Figure 4

Figure 5 shows jumper connections for using the High Speed opto-coupled input channel of OPTO-1. Jumper HS1.4 should be installed.

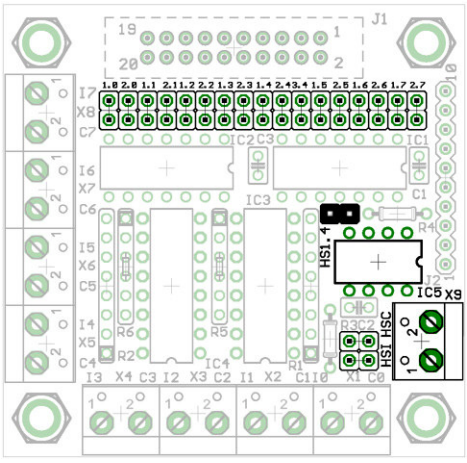


Figure 5

Figure 6 shows board configuration for using High Speed input channel of OPTO-1 without 6N137. IC5 6N137 should be removed from the socket and jumpers HS1.4, HIS, HSC should be installed to the board. This allows directs access to the input port of the micro-controller but bypasses the opto-isolation feature.

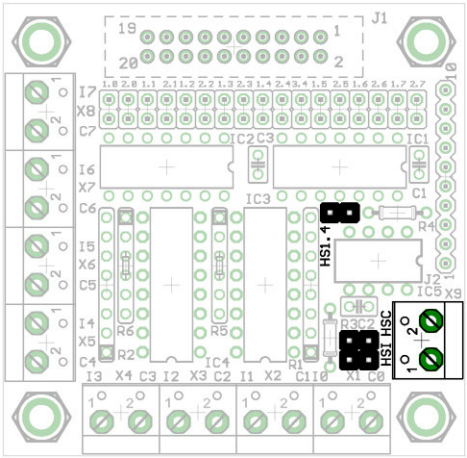


Figure 6

Figures 7, 8 shows the board configuration for using High Speed optocoupled input channel and Low Speed input channels of OPTO-1.

Because jumper HS1.4 is installed for using of the High Speed channel, it is possible to use Port 2 through connector J2 for Low Speed input channels. In this case jumpers should be installed according to Figure 7.

Figure 8 shows the installed jumpers for using Port1.7-5, Port3.4 and Port1.3-0 lines of a host MCU for Low Speed opto-coupled input channels and Port1.4 line for the High Speed input channel.

WARNING: Jumper 1.4 should not be installed if jumper HS1.4 is used.

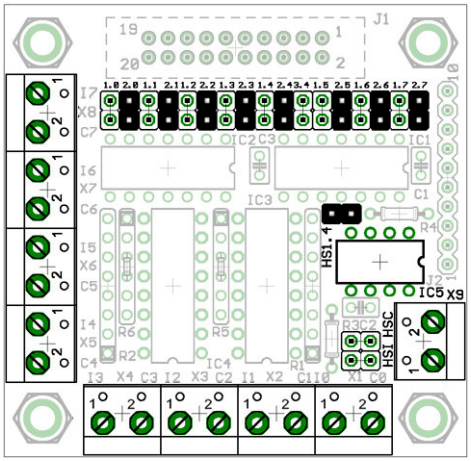


Figure 7

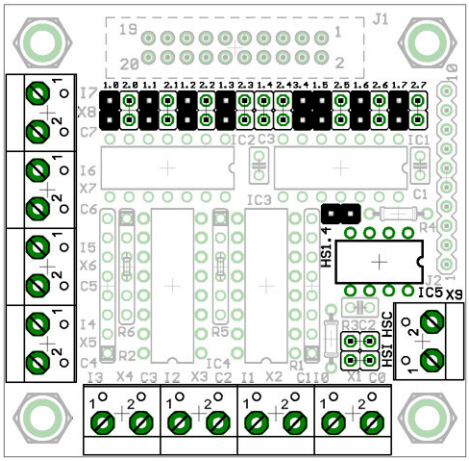


Figure 8

Figures 9 and 10 show jumper configuration for using Low Speed input channels of OPTO-1 if High Speed input channel is unused and jumper HS1.4 is removed.

Figure 9 shows jumper configuration for using Port 1 of the host MCU through connector J1.

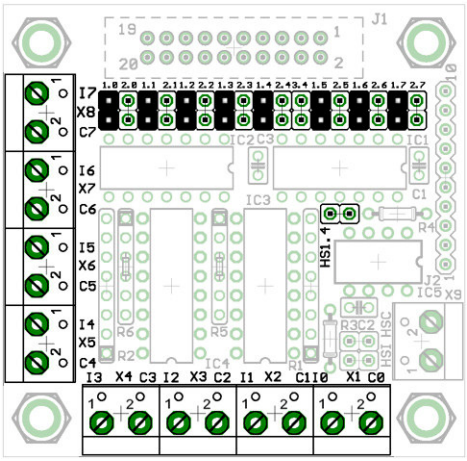


Figure 9

Figure 10 shows jumper configuration for using Port 2 of the host MCU through connector J2 for processing of Low Speed input channels.

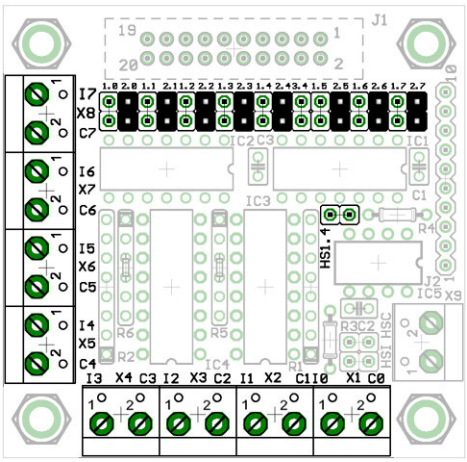


Figure 10

Figure 11 shows connections for using OPTO-1 with PC844X to measure a frequency of a 110V AC source.

Be careful!
Direct connection OPTO-1 board to a high voltage AC source is impermissible!

Only High Speed opto-coupled input channel of **OPTO-1 with PC844X** may be used for connection with AC source.

Jumpers HIS and HSC should be removed from the socket. Jumper HS1.4 should be installed.

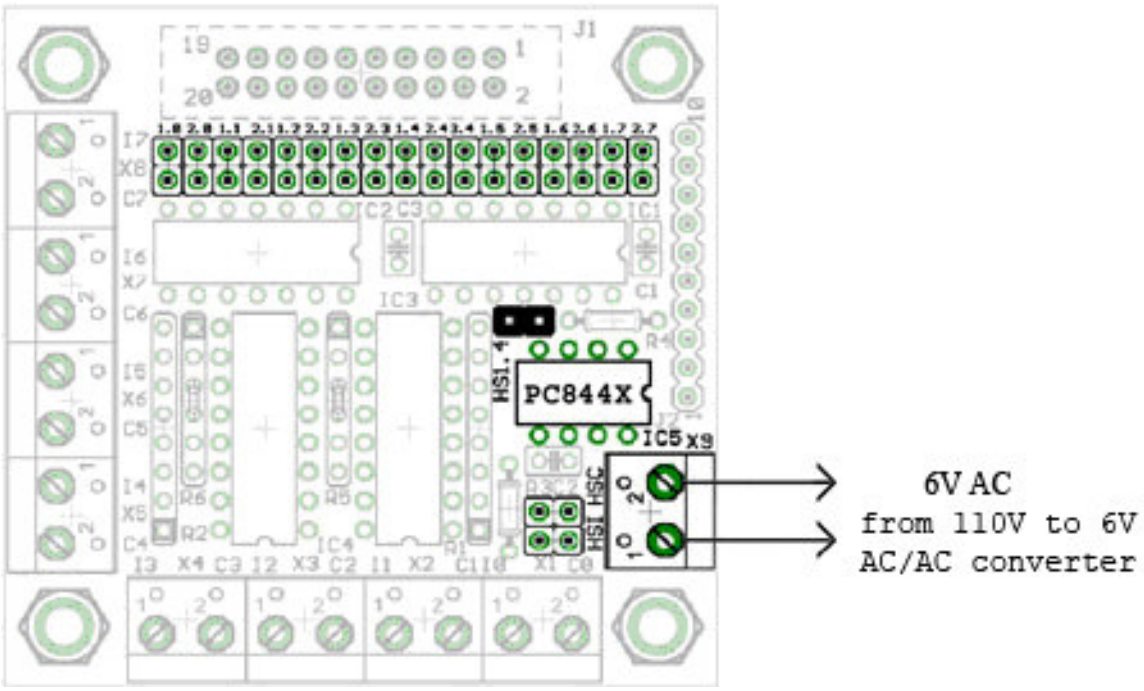
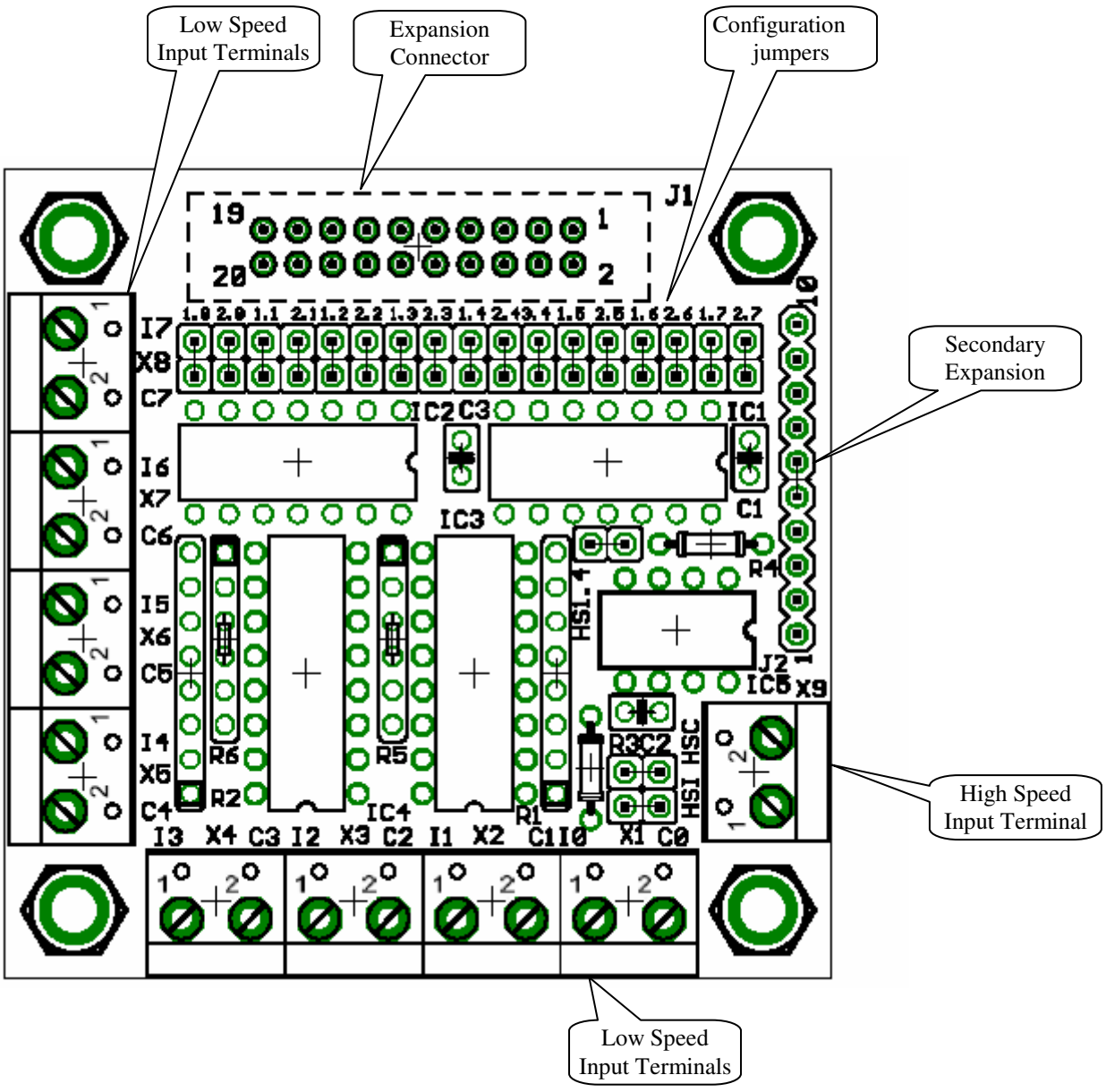


Figure 11

5. Board Layout

Layout of OPTO-1 board is shown below:



6. Schematics