OPTO-9
Peripheral Board
Technical Manual

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WARRANTY:

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1. Overview

OPTO-9 is a opto-isolated input peripheral board for the MINI-MAX series of micro-controller systems.

OPTO-9 has eight opto-isolated input channels with 10 kHz frequency response and one channel with high speed optocoupler.

OPTO-9 is powered from 5 Volts DC through the 20-pin expansion connector.

Software examples for OPTO-9 peripheral board are available from www.bipom.com

2. Specifications

OPTO-9 board has the following configuration:

- 8 channels of LTV846 optoisolators with 10 KHz frequency response.
- 1 channel with high speed 10 MBit/second logic gate 6N137 optocoupler
- 16-pin terminal block for 8 regular speed inputs
- Maximum reverse voltage value is 6V.
- 2-pin terminal block for high speed input (logic level voltages)
- Configuration of regular 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
- 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.
- -40° - +85° C operating and storage temperature range.

3. Functional Blocks
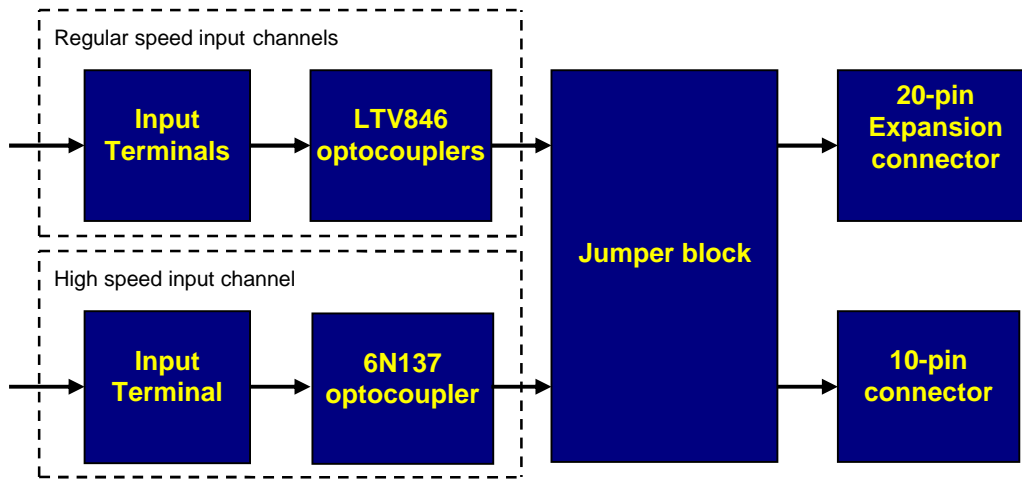
Figure 1 shows the block diagram of the OPTO-9 system:

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-9 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 #: CBL-EXP-6). Table 1 shows the pin assignments for the connector J1:

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 J2:

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:

Jumper	If installed	Notes
HSI	Connects High Speed Input (+Vx) to 6N137 optocoupler output	Bypasses 6N137 optocoupler
HSC	Connects High Speed Input (-Vx) to Ground	Bypasses 6N137 optocoupler
HS1.4	Connects Port 1.4 to 6N137 buffered output	**Do not install if Port 1.4 is used by the host microcontroller.**
1.0	Connects Channel 0 optocoupler to Port 1.0	
2.0	Connects Channel 0 optocoupler to Port 2.0	
1.1	Connects Channel 0 optocoupler to Port 1.1	
2.1	Connects Channel 0 optocoupler to Port 2.1	
1.2	Connects Channel 0 optocoupler to Port 1.2	
2.2	Connects Channel 0 optocoupler to Port 2.2	
1.3	Connects Channel 0 optocoupler to Port 1.3	
2.3	Connects Channel 0 optocoupler to Port 2.3	
1.4	Connects Channel 0 optocoupler to Port 1.4	**Do not install if HS1.4 is used!**
2.4	Connects Channel 0 optocoupler to Port 2.4	
1.5	Connects Channel 0 optocoupler to Port 1.5	**WARNING: Using Port 1.5 may cause unintended reset on some MINI-MAX boards such as MINI-MAX/51-C2. Please check MINI-MAX technical manual.**
2.5	Connects Channel 0 optocoupler to Port 2.5	
1.6	Connects Channel 0 optocoupler to Port 1.6	
2.6	Connects Channel 0 optocoupler to Port 2.6	
1.7	Connects Channel 0 optocoupler to Port 1.7	
2.7	Connects Channel 0 optocoupler to Port 2.7	

Table 4

Power Supply

When not using OPTO-9 with MINI-MAX boards, external power supply should be able to supply regulated 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-9 board can either be stacked on top of MINI-MAX board using stand-offs or connected in a chain configuration using flat ribbon cable. Figure 2 shows how OPTO-9 can be connected to a microcontroller board in a stacked fashion. Figure 3 shows chain connection (without using cable for additional 10-pin connector J2).
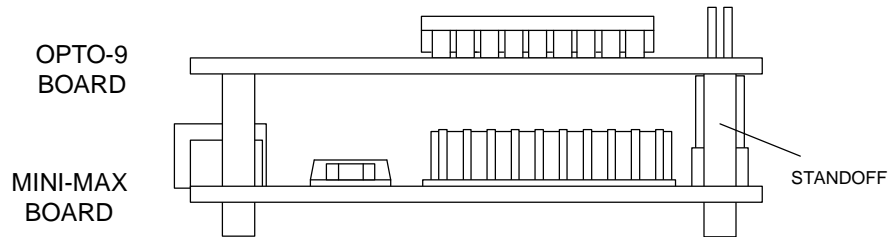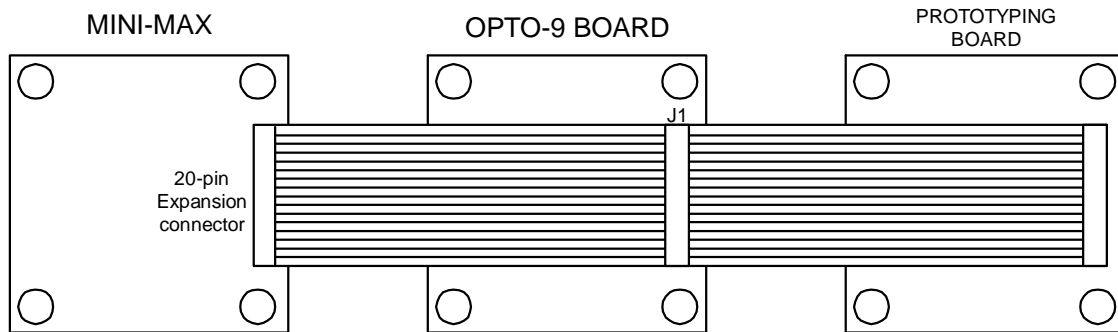

Figure 2

Figure 3

More details on BiPOM Peripheral boards are available from the link below:
http://www.bipom.com/periph_cat/us/44/0.html

8051/52, BASCOM51 and SDCC (Small Device C Compiler) development systems provide examples for OPTO-9.

Please download any of these development systems from:

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

Figure 4 shows connecting OPTO-9 board to external circuitry.

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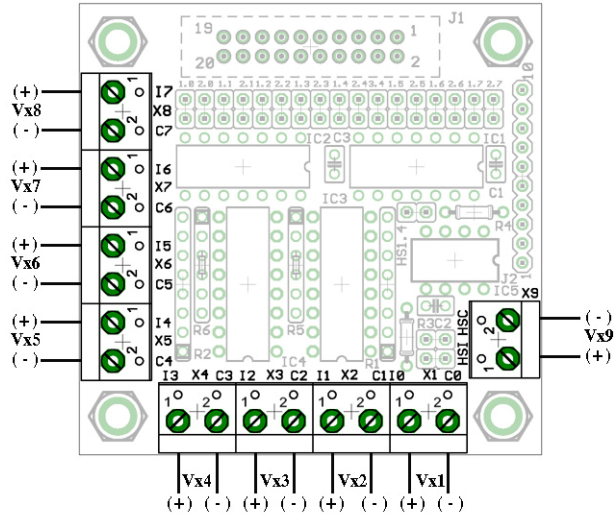

Figure 4

Figure 5 shows jumper connections for using the High Speed opto-coupled input channel of OPTO-9. Jumper HS1.4 should be installed.
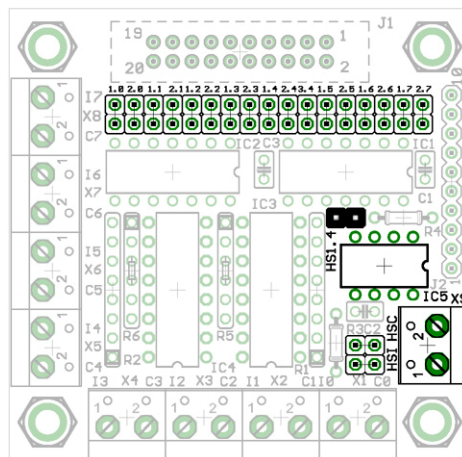

Figure 5

Figure 6 shows board configuration for using High Speed input channel of OPTO-9 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.
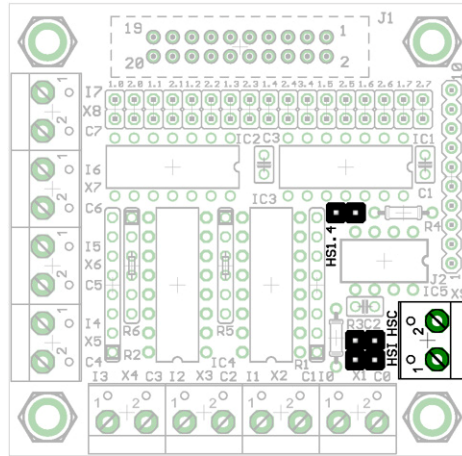

Figure 6

Figures 7 and 8 show the jumper configuration for using High Speed optocoupled input channel and Regular Speed input channels of OPTO-9 at the same time.

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

Figure 8 shows installed jumpers for using Ports P1.0 through P1.3, P3.4 and P1.5 through P1.7 of a host microcontroller for Regular Speed opto-coupled input channels and P1.4 line for the High Speed input channel.

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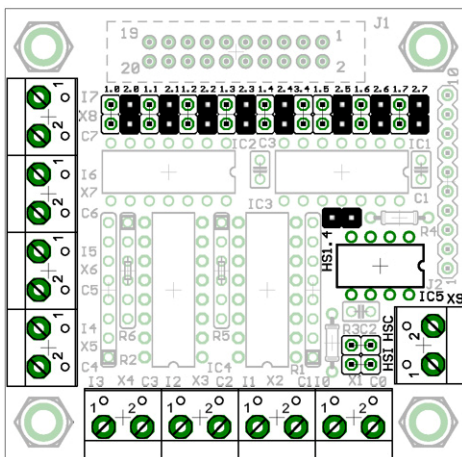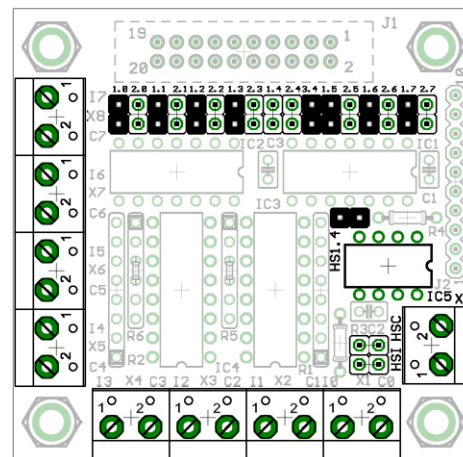

Figure 7

Figure 8

Figures 9 and 10 show jumper configuration for using Regular Speed input channels of OPTO-9 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 microcontroller through expansion connector J1.
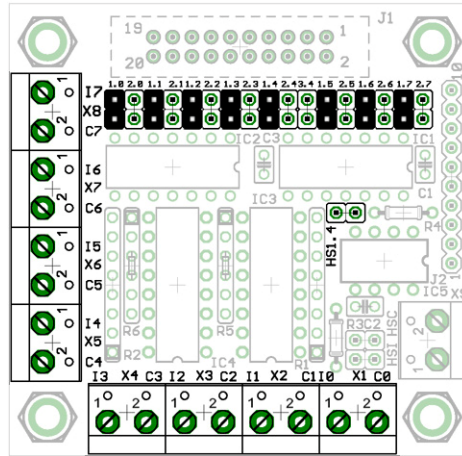

Figure 9

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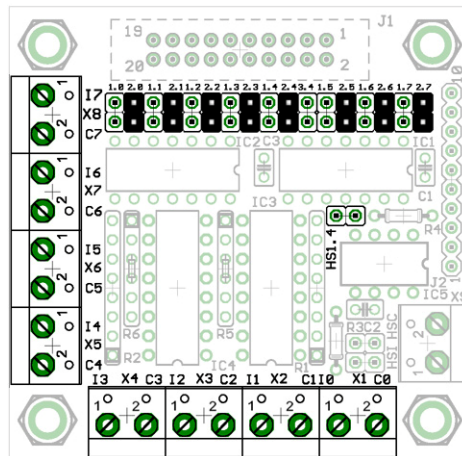

Figure 10

Figure 11 shows connections for using OPTO-9 with optional PC844X optocouplers to measure the frequency of the power mains through a 110VAC to 6VAC transformer.

WARNING: Direct connection OPTO-9 board to a high voltage AC source is dangerous and may cause damage and bodily injury!!!

Only High Speed opto-coupled input channel of **OPTO-9 with PC844X** may be used for connection with AC source.

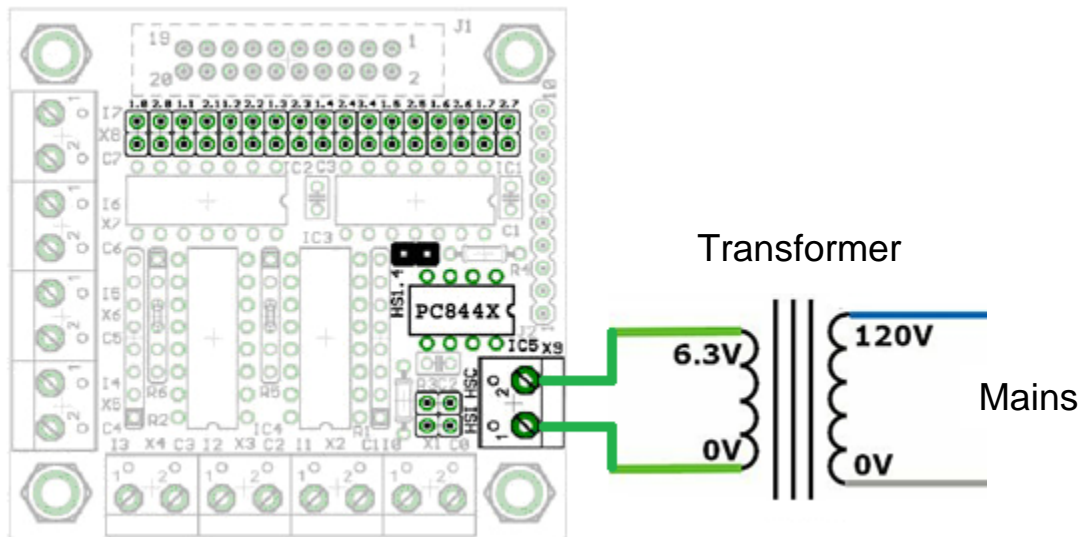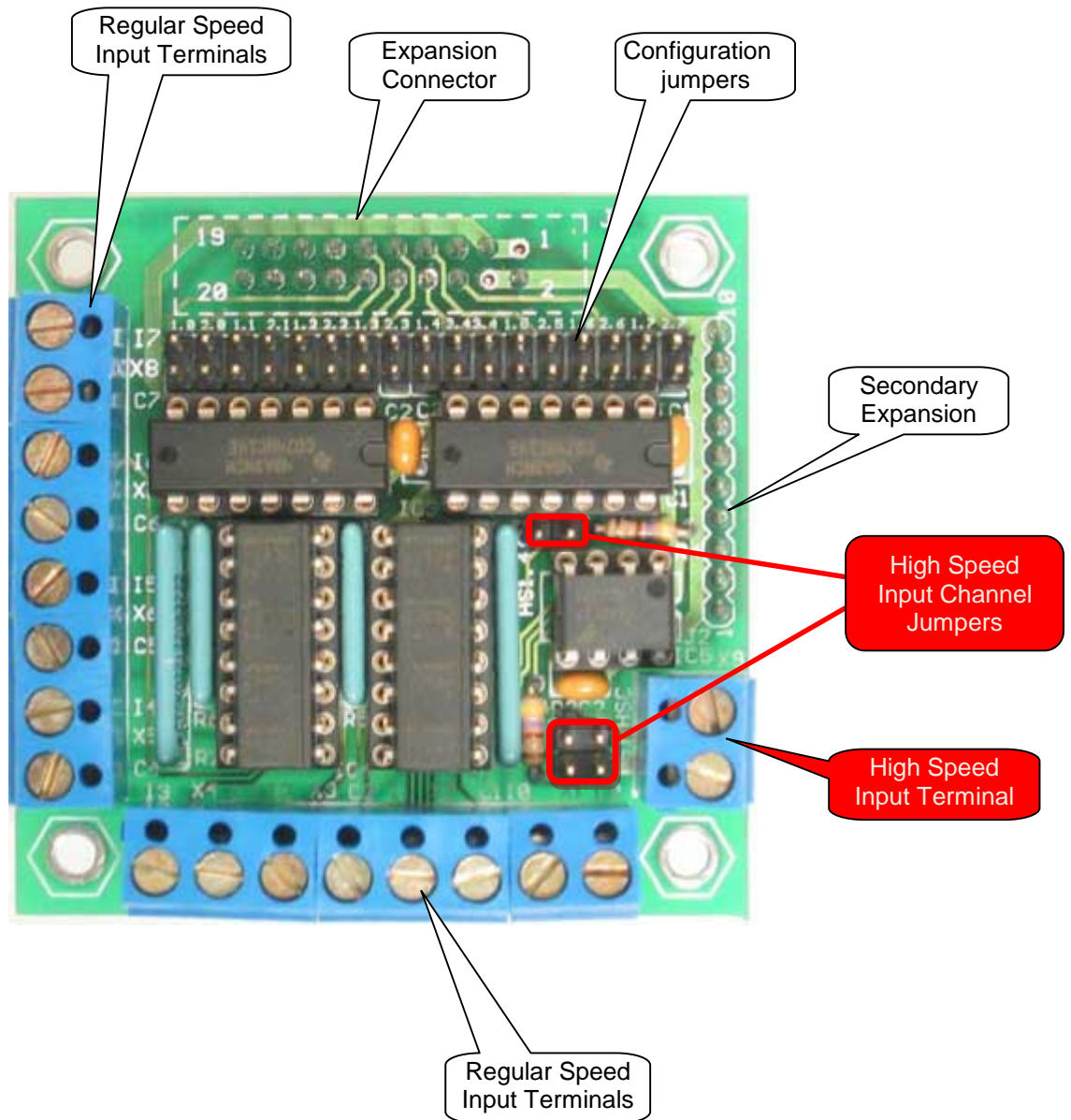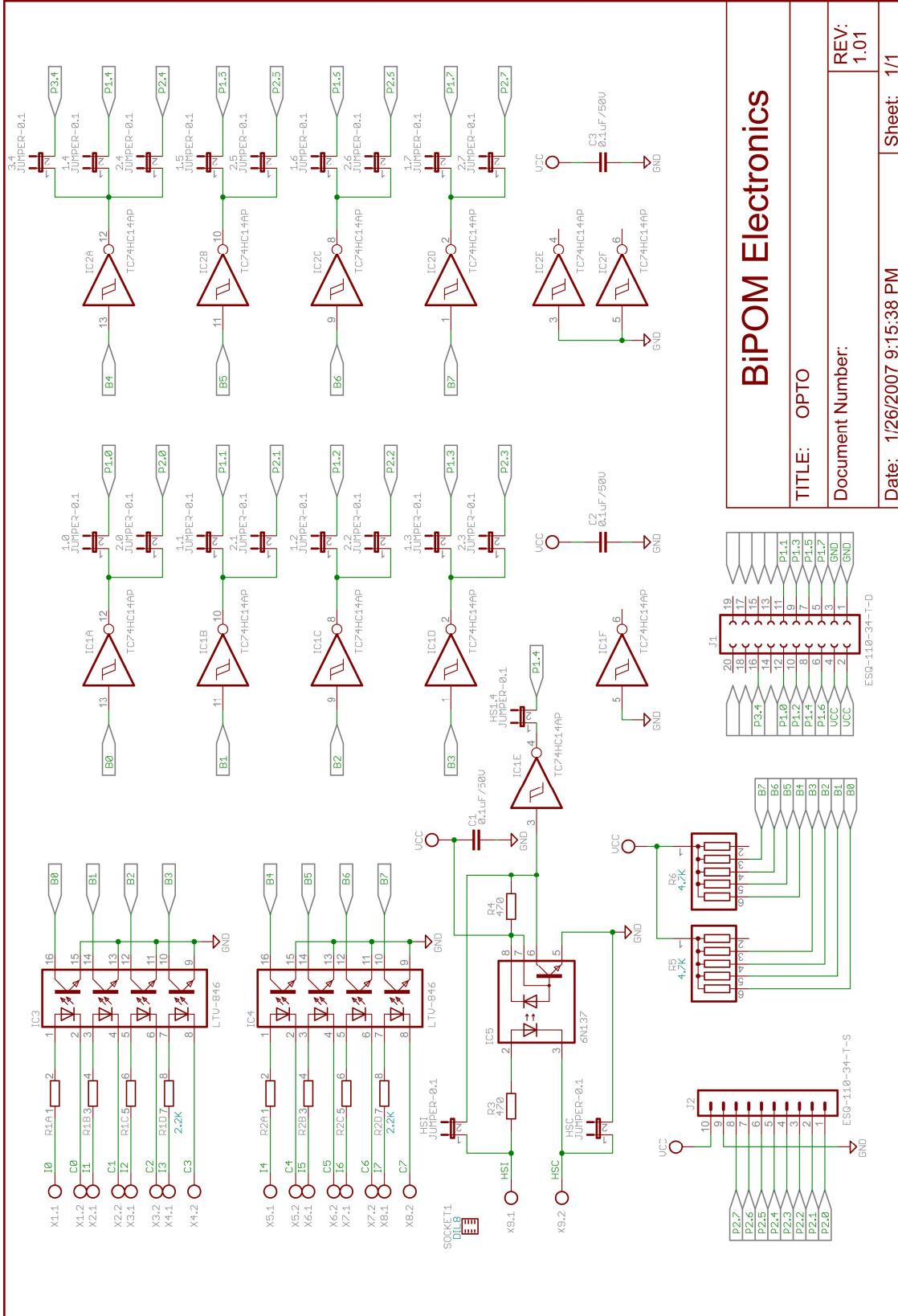Jumpers HIS and HSC should be removed from the socket. Jumper HS1.4 should be installed.

Figure 11

5. Board Layout

Layout of OPTO-9 board is shown below:

6. Schematics

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