LED

Peripheral Board

Technical Manual

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BiPOM Electronics

WARRANTY:

BiPOM Electronics warrants LED board for a period of 1 year .   If the board becomes defective during this period, BiPOM Electronics 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 LED board. 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's liability is limited to the purchase price of this product.

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1. Overview

LED is peripheral board with four 7-segment LED displays with decimal point. The displays are placed on DIL-40 socket and can be easily replaced. 4-digit LED driver SAA1064 from Philips Semiconductors with I2C-Bus interface is installed to this board. The segment outputs of LED-driver are controllable current-sink sources. To prevent a damaging of LED driver the current limit resistors are added to the board. Segment outputs are switched on by the corresponding data bits and their current is adjusted by control bits. LED driver on the board is controlled via an I2C-compatible serial bus.

The boards directly interface via expansion connector to Single Board Computer (SBC) systems from Bipom Electronics such as PRO-MAX/51,MINI-MAX/51,MINI-MAX/908. This family of SBC provides all the essential elements of a computer system such as microprocessor, memory, serial port, parallel ports, timers, counters and interrupt handlers on a single chip.

2. Specifications

LED board has the following configuration:

- Four 7-segment LED displays with decimal point

- DIL-40 socket for a placing of LED displays

- 4-digit LED driver SAA1064

- Control scheme for multiplexing

- Current limit resistors

- Expansion Bus Connector

- Main Connector

Dimensions are 2.35 X 2.40 inches (5.97 X 6.10 centimeters).
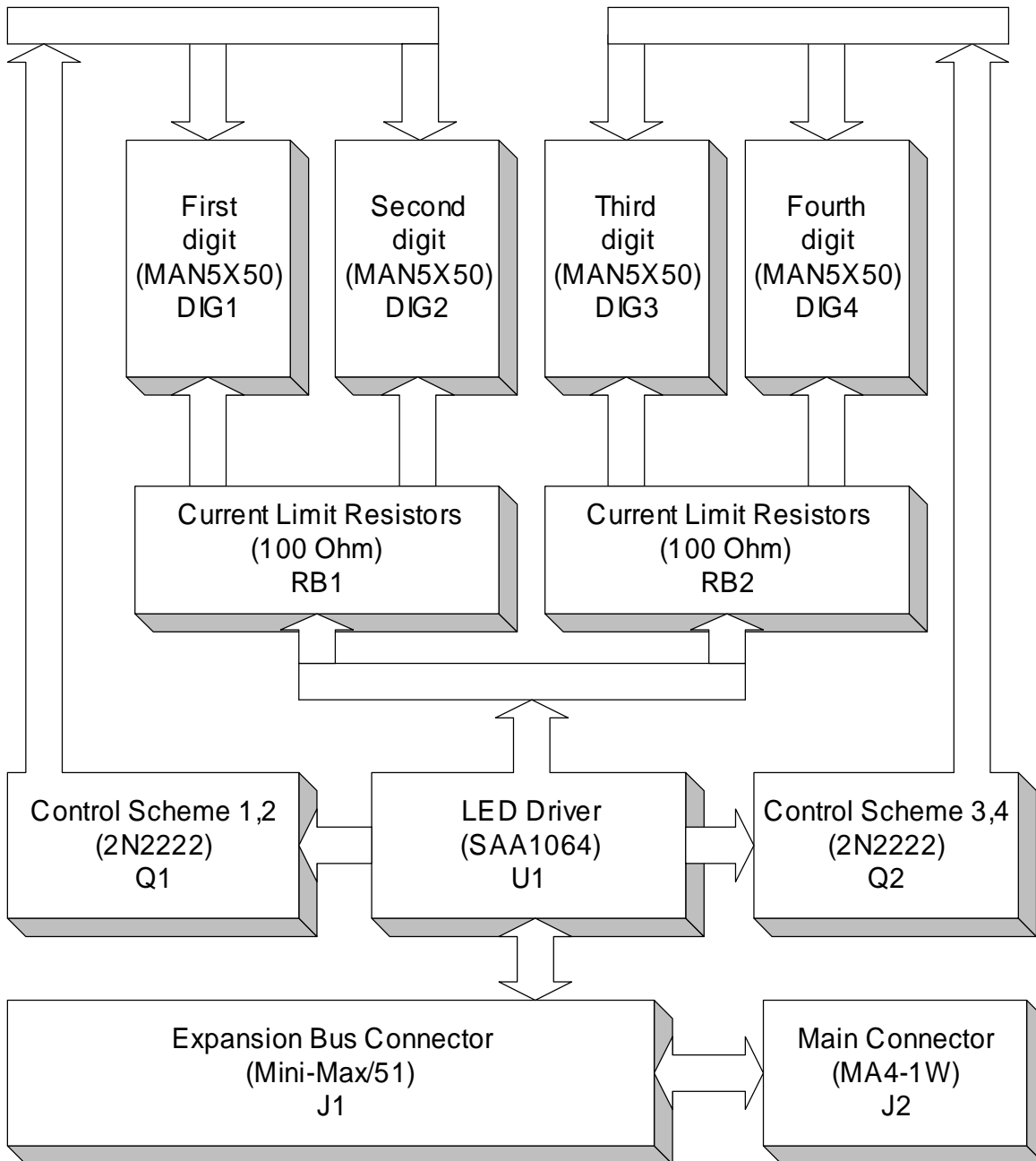
Mounting holes of 0.138 inches (3.5 millimeters) on four corners.

0° - 70° C operating, -40° - +85° C storage temperature range.

3. Functional Blocks

Figure 1 shows the block diagram of the LED board.

Figure 1

LED displays with decimal point

MAN5X50 series of 0.51inch (13mm) 7-segment common anode displays (DIG1-DIG4) is installed to the board. The displays are characterized by high brightness with high contrast. There are following types of the displays:

- MAN5350 Yellow color

- MAN5450 Green color

- MAN5750 Red color

- MAN5950 Orange-Red color

More information on the MAN5X50 displays can be obtained from QT Optoelectronics.

DIL-40 socket

The displays are placed on socket and can be easily replaced. The standard DIL-40 socket is installed to LED board.

4-Digit LED driver

The LED driver SAA1064 (U1) is a bipolar integrated circuit made in an I2L compatible 18 volts process. The circuit is especially designed to drive four 7-segment LED displays with decimal point by means of multiplexing between two pairs of digits. It features an I2C-Bus slave transceiver interface with the possibility to program four different SLAVE ADDRESSES, a POWER RESET flag, 16 current sink OUTPUTS, controllable by software up to 21 mA, two multiplex drive outputs for common anode segments, an on-chip multiplex oscillator, control bits to select static,dynamic and blank mode, and one bit for segment test.
More information on the 4-digit LED driver SAA1064 can be obtained from Philips Semiconductors.

Control scheme for multiplexing

The multiplex outputs MX1 and MX2 of LED driver are switched alternately in dynamic mode with a frequency derived from the clock-oscillator. In static mode MX1 is switched on. The outputs consist of an emitter-follower, which can be used to drive the common anodes of two displays directly provided that the total power dissipation of the circuit is not exceeded. External transistors Q1,Q2 prevent an exceeding of the total power dissipation.

Current Limit Resistors

To prevent a damaging of LED driver the current limit resistors(RB1,RB2) were added to the scheme.

Expansion Bus Connector

All the control pins and power supply are available on the 20-pin Expansion Bus connector(J1) for interfacing to existing SBC boards. LED peripheral board can be connected either as a piggyback daughter-board on SBC board using standoffs or can be placed up away from SBC board using a 20-wire ribbon cable. Table 1 shows the pin assignments of Expansion Bus connector.

Table 1   **Expansion Bus 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	4	3	GND
VCC	2	1	GND

Main Connector

LED board can be powered from 5 Volts DC of external power source. Both I2C control (SDA,SCL) and power supply pins are available on the 4-pin Main connector(J2) for interfacing to existing SBC boards. Table 2 shows the pin assignments of Main connector.
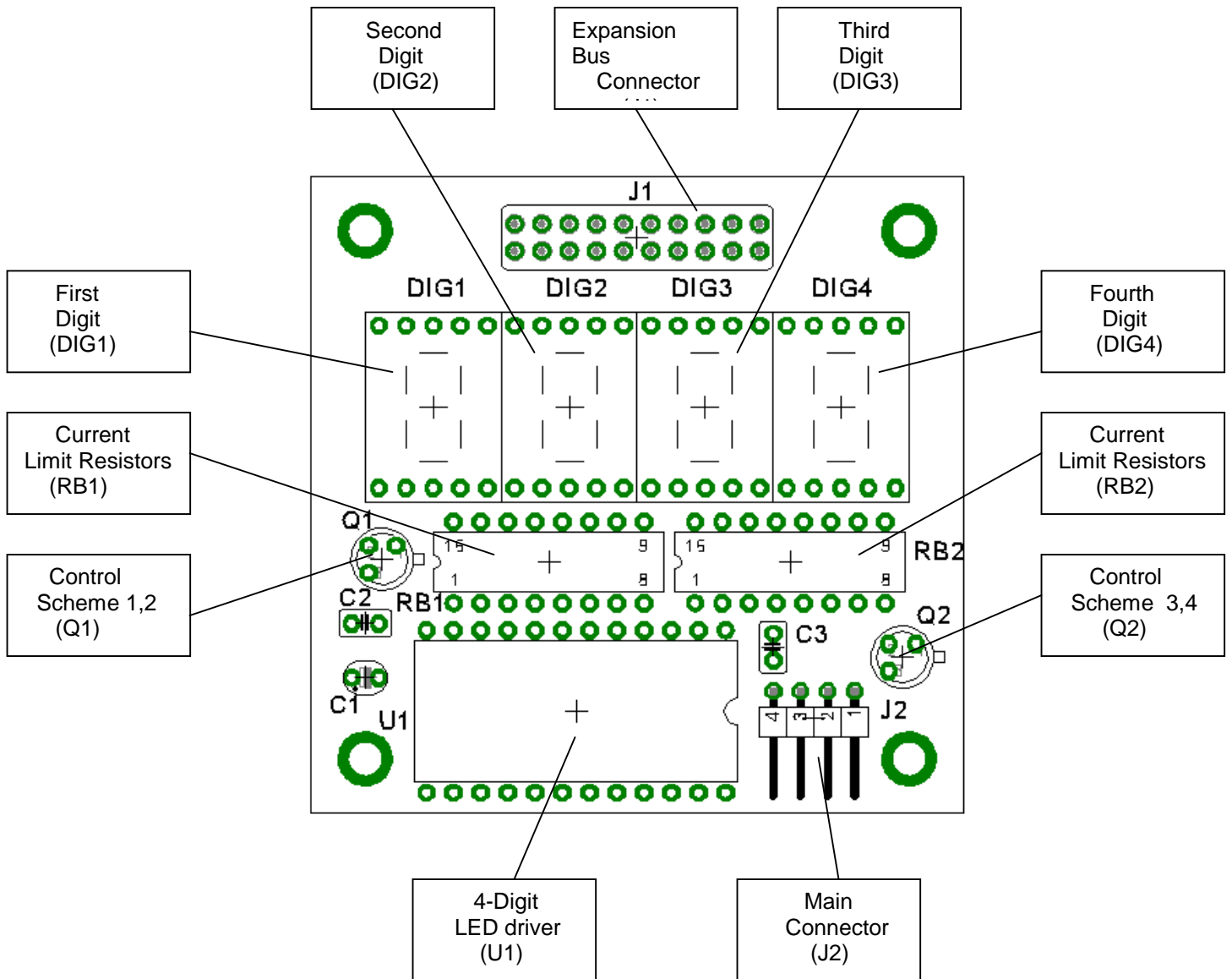
Table 2   **Main Connector (J2)**

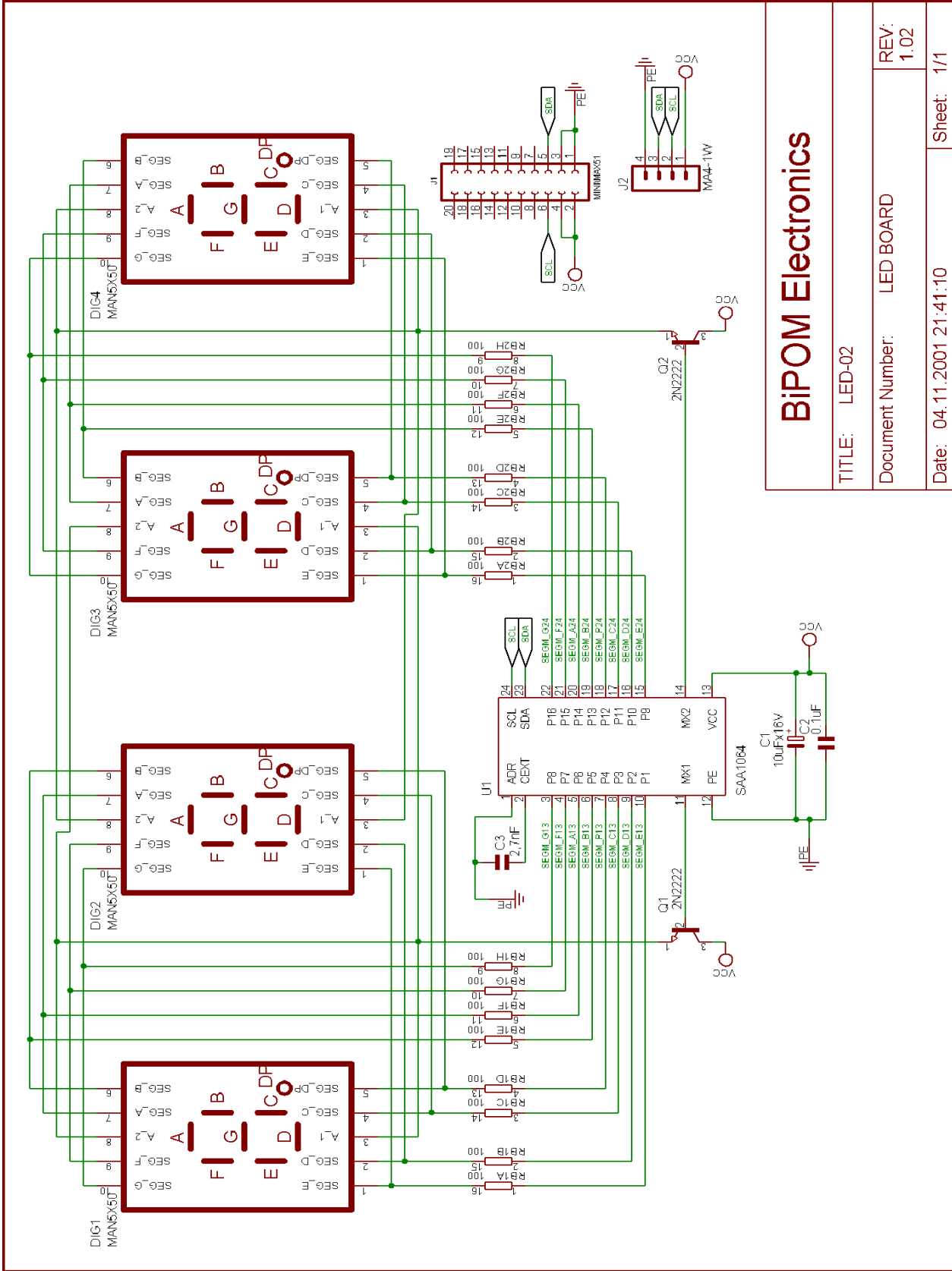| Signal	Pin
VCC	1
SCL	2
SDA	3
GND	4

4. Board Layout

Figure 2 shows positions of major components and connectors on the LED board.

Figure 2

Second Digit (DIG2)

Expansion Bus Connector

Third Digit (DIG3)

First Digit (DIG1)

Fourth Digit (DIG4)

Current Limit Resistors (RB1)

Current Limit Resistors (RB2)

Control Scheme 1,2 (Q1)

Control Scheme 3,4 (Q2)

4-Digit LED driver (U1)

Main Connector (J2)

5.Schematic

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