SUNDANCE

SMT373

User Manual

Certificate Number FM 55022

Revision History

Date	Comments	Engineer	Version
17/09/99	Initial release	J.V.	1.0
12/10/99	Pin-out name modified and RS422/485 possibility added	J.V.	1.1
31/10/99	Physical layout added	J.V.	1.2
05/11/99	External connector pin-out	J.V.	1.3
18/11/99	Height of the module added	J.V.	1.4
28/02/00	External connector pin-out update	J.V.	1.5
07/04/00	Storage temperature added	J.V.	1.6
30/11/00	Changed the document layout to the new template. Also changed some of the text so it used a consistent font.	M.A.	1.7
27/01/05	Pinout corrected for DIR2 and DIR0 Update for shb compatibility using shb2sdb adaptor.	J.V.	1.8

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Scope

This document describes the SMT373 I/O module.

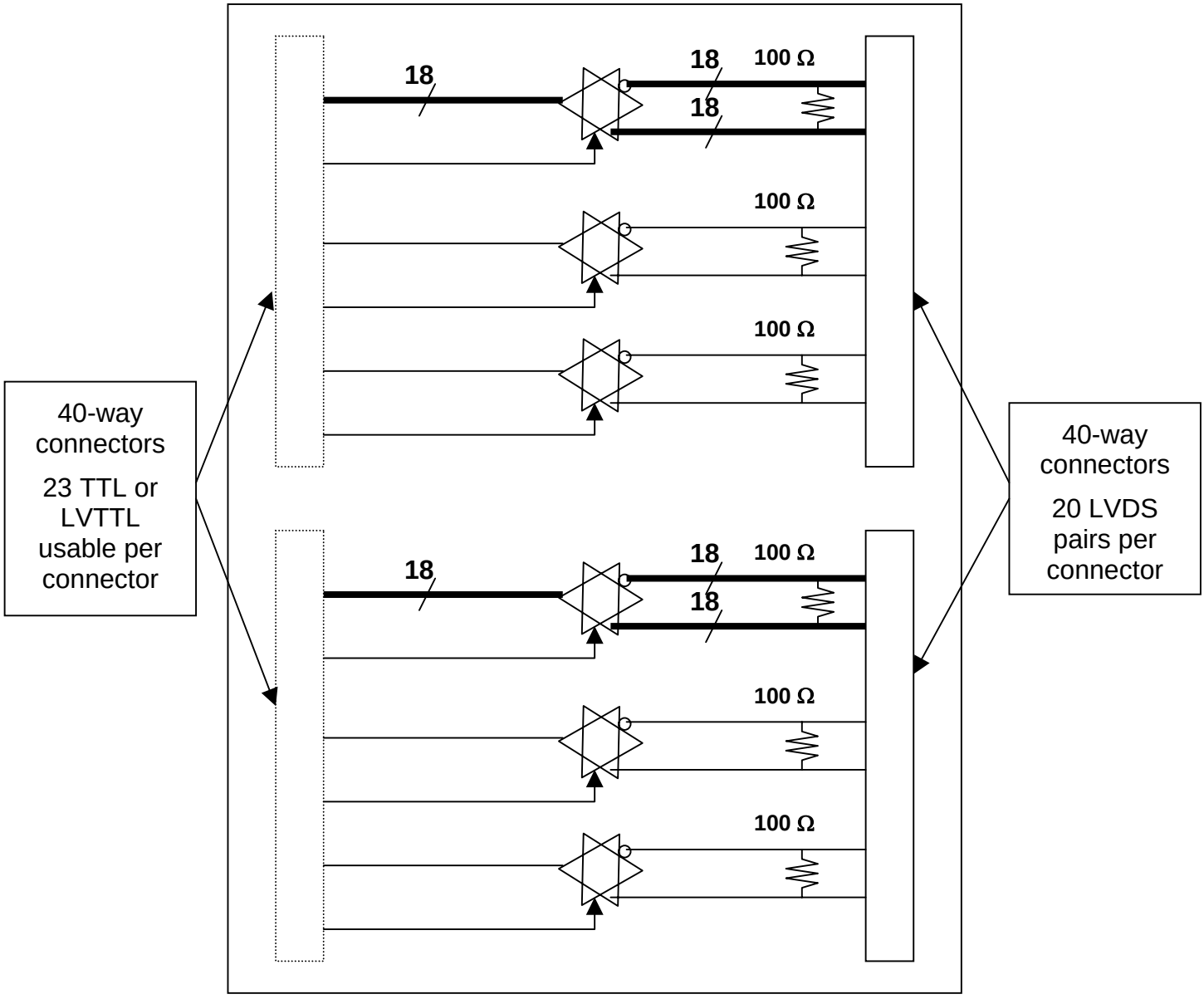
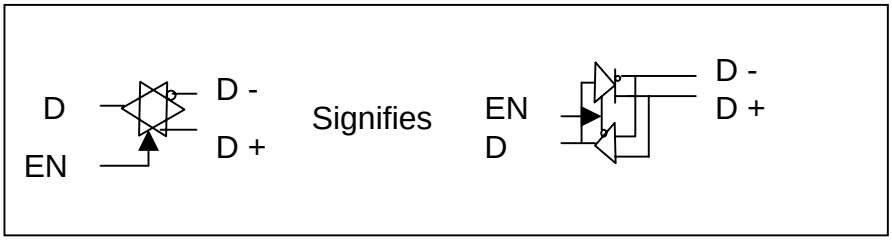


Figure 1 Connectivity diagram

Legend



Main features

The SMT373 converts Sundance Digital Bus SDB LVTTL signals to Low-Voltage Differential Signals (LVDS) and can connect two systems several meters apart.

The board operates a conversion between LVTTL (TTL tolerant) signals and Low Voltage Differential Signals. It provides two bi-directional 20-bit channels that can transfer up to 2 GBytes/s thanks to 40 SN65LVDM176 transceivers from TI that can individually reach 400Mbits/s.

Each channel provides 16 bits of data, a clock and a clock-enable signals with their direction controlled by a single signal. Two other signals can be used for the bus arbitration in a bi-directional application. The direction of each of them can be controlled independently.

All the direction control signals are accessible through the connectors and therefore can be set by the board they are connected to.

The Sundance Digital Bus already provides 200Mbytes/s data transfer rate between TIMs. Thanks to this module a TIM can communicate with another board several meters away.

It only requires 3.3V Power supply.

Technical Description

There are two versions of the board, which differ in the way the TTL signals are input.

Version 1: Direct connection. The Mezzanine card is connected PCB to PCB on a carrier TIM through well-positioned SDB connector as they are on the SMT358.

Version 2: Remote connection. The Mezzanine card is connected through SDB cables. It only needs the 3.3V provided through the mounting holes.

The board uses LVDM transceivers. They are TIA/EIA-644 standard compliant devices except that the output current of the drivers is doubled. The board is compatible with LVDS drivers and has 100Ω termination resistors. It is compatible with LVDS receivers because it outputs twice the current of a LVDS driver and therefor will keep the same voltage for a double terminated line. In half-duplex transmissions it has the advantage to keep the voltage as in unidirectional transmissions whereas LVDS would have reduced it by two due to the double terminated lines.

If the line is not driven or in open-circuit, the output is forced high.

The SN65LVDM176 main features are following:

- Low-Voltage Differential Driver and Receiver for Half-Duplex Operation
- Designed for Signalling Rates of 400 Mbit/s
- ESD Protection Exceeds 12 kV on Bus Pins
- Operates from a Single 3.3 V Supply
- Low-Voltage Differential Signalling with Typical Output Voltages of 350 mV and a 50 Ω
- Load Propagation Delay Times
  - Driver: 1.7 ns Typical
  - Receiver: 3.7 ns Typical
- Power Dissipation at 200 MHz
  - Driver: 50 mW Typical
  - Receiver: 60 mW Typical
- LVTTL Levels are 5 V Tolerant Bus Pins are High Impedance when Disabled or With VCC Less Than 1.5 V Open-Circuit
- Fail-safe receiver
- Characterised for operation from -40°C to 85°C.
- Storage temperature range from -65°C to 150°C.

Module height

When the SMT373 is directly connected to the SMT358 as a piggy-back board (Direct connection version) the resulting height with the top LVDS cables fitted is 1,25 inches (3 cm) from the top layer of the carrier board.

The Remote version of the board can be fitted on a spare TIM site or anywhere else (as long as 3.3V is provided) and uses SDB cables to be connected to the module. The height of the module itself including the connectors is 0.5 inches (1.3 cm). So for example on a TIM slot the maximum height with the cable fitted is 0.75 inches (1.9 cm) from the top layer of the carrier board.

Connectors Pin-out

Function	Pin	Pin	Function
GND	2	1	CLK
GND	4	3	D0
GND	6	5	D1
GND	8	7	D2
GND	10	9	D3
GND	12	11	D4
GND	14	13	D5
GND	16	15	D6
GND	18	17	D7
GND	20	19	D8
GND	22	21	D9
GND	24	23	D10
GND	26	25	D11
GND	28	27	D12
GND	30	29	D13
GND	32	31	D14
GND	34	33	D15
DIR2	36	35	USERDEF0
DIR0	38	37	WEN
DIR1	40	39	USERDEF1

Figure 2 SDB connector pin-out

DIR0 sets the direction of the line USERDEF0, DIR1 of the line USERDEF1 and DIR2 of lines D0 to D15, CLKIN and WEN. Each transceiver acts as a driver when its direction pin is high and as a receiver when its direction pin is low.

Function	Pin	Pin	Function
GND	2	1	CLK
GND	4	3	D0
GND	6	5	D1
GND	8	7	D2
GND	10	9	D3
GND	12	11	D4
GND	14	13	D5
GND	16	15	D6
GND	18	17	D7
GND	20	19	D8
GND	22	21	D9
GND	24	23	D10
GND	26	25	D11
GND	28	27	D12
GND	30	29	D13
GND	32	31	D14
GND	34	33	D15
NC	36	35	USERDEF0
DIR0	38	37	WEN
DIR1	40	39	USERDEF1

Figure 3 SDB connector pin-out for shb2sdb adaptors

The SMT373 is modified. DIR0 sets the direction of the line USERDEF0, D0 to D15, CLKIN and WEN.

DIR1 of the line USERDEF1.

Each transceiver acts as a driver when its direction pin is high and as a receiver when its direction pin is low.

This allows for direction control and flow control.

Function	Pin	Pin	Function
CLKIN +	2	1	CLKIN -
D0 +	4	3	D0 -
D1 +	6	5	D1 -
D2 +	8	7	D2 -
D3 +	10	9	D3 -
D4 +	12	11	D4 -
D5 +	14	13	D5 -
D6 +	16	15	D6 -
D7 +	18	17	D7 -
D8 +	20	19	D8 -
D9 +	22	21	D9 -
D10 +	24	23	D10 -
D11 +	26	25	D11 -
D12 +	28	27	D12 -
D13 +	30	29	D13 -
D14 +	32	31	D14 -
D15 +	34	33	D15 -
USERDEF0 +	36	35	USERDEF0 -
WEN+	38	37	WEN -
USERDEF1 +	40	39	USERDEF1 -

Figure 3 LVDS connector pin-out

External connector pin-out

A 68-way SCSI connector is fitted on the back-plate of the PC for the external transmission. Ref: SMT373-CAB.

The connector is a HARTING 60 04 068 5344 (screw lock 60 01 000 9020).

Standard twisted pair or flat ribbon SCSI cables can be used.

Signal Name	Pin	Pin	Signal Name
Open	1	35	open
Open	2	36	open
Open	3	37	open
Open	4	38	open
Open	5	39	GND
GND	6	40	GND
GND	7	41	GND
CLKIN +	8	42	CLKIN -
D0 +	9	43	D0 -
D1 +	10	44	D1 -
D2 +	11	45	D2 -
D3 +	12	46	D3 -
D4 +	13	47	D4 -
D5 +	14	48	D5 -
D6 +	15	49	D6 -
D7 +	16	50	D7 -
D8 +	17	51	D8 -
D9 +	18	52	D9 -
D10 +	19	53	D10 -
D11 +	20	54	D11 -
D12 +	21	55	D12 -
D13 +	22	56	D13 -
D14 +	23	57	D14 -
D15 +	24	58	D15 -

USERDEF0 +	25	59	USERDEF0 -
WEN+	26	60	WEN -
USERDEF1 +	27	61	USERDEF1 -
GND	28	62	GND
GND	29	63	GND
GND	30	64	open
open	31	65	open
open	32	66	open
open	33	67	open
open	34	68	open

Figure 4 External connector pin-out

Connectors position

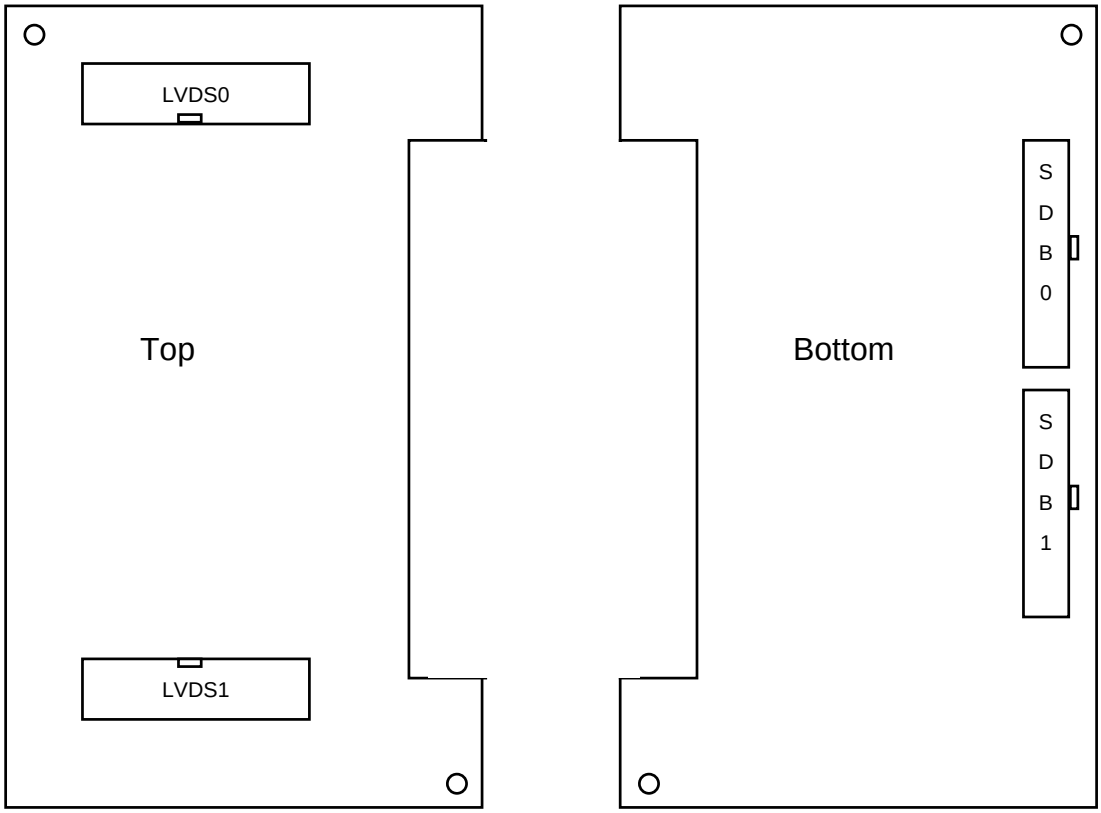


Figure 5 Version 1: Direct connection

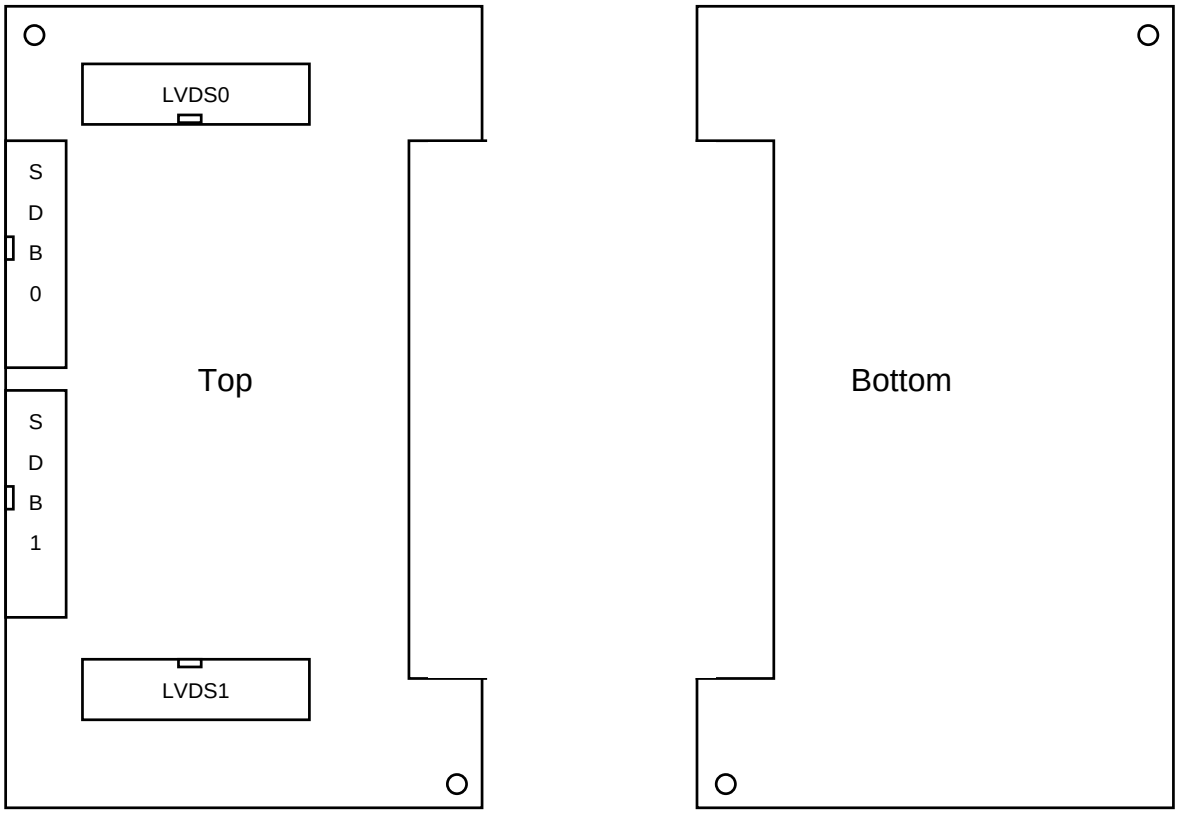


Figure 6 Version 2: Remote connection

Physical Layout

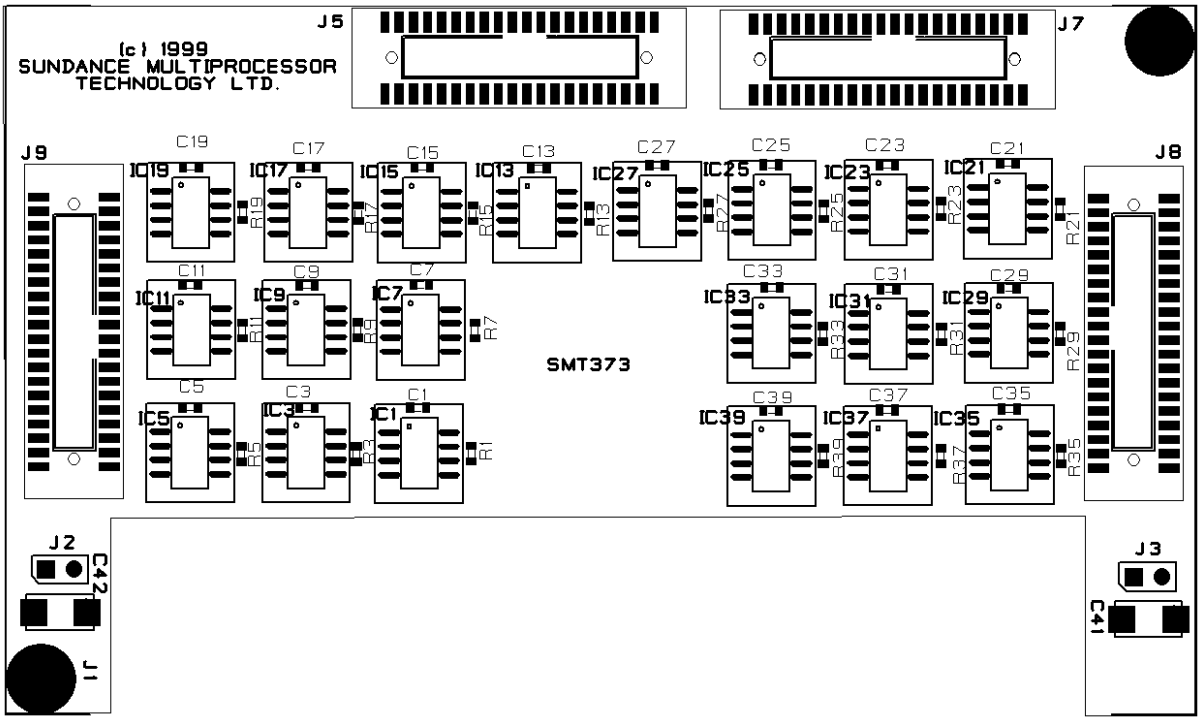


Figure 7 Top physical layout

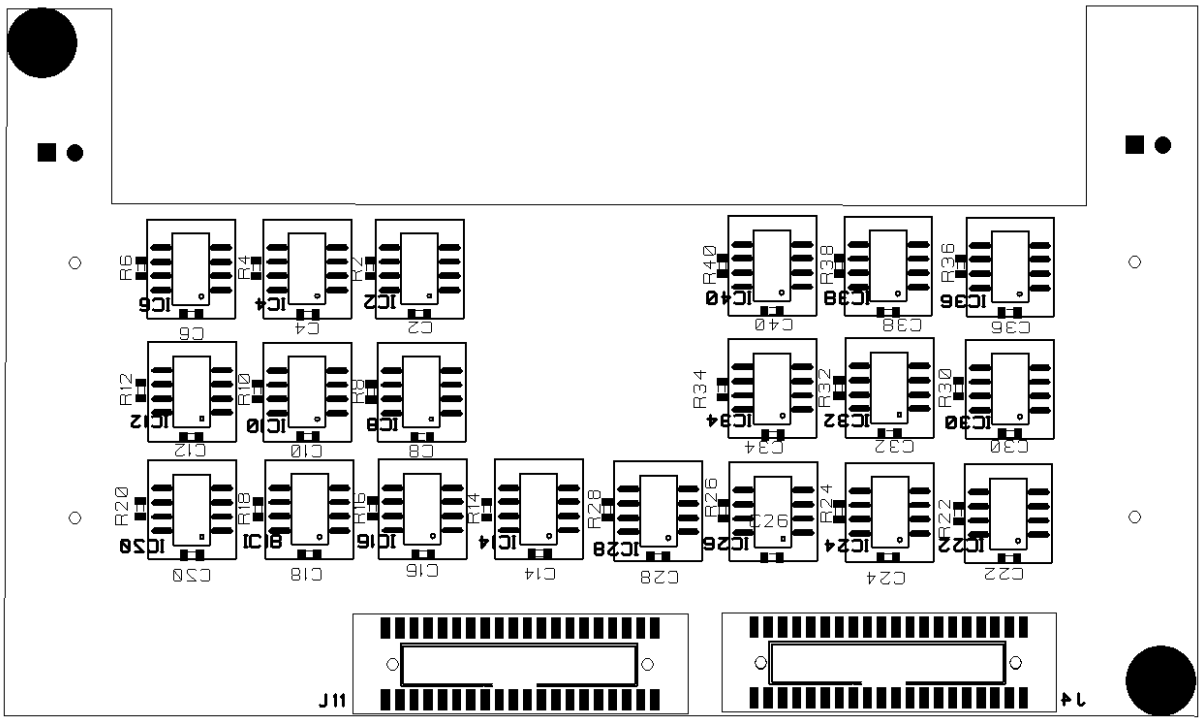


Figure 8 Bottom physical layout