

HLS (MKY37) 32IN Slave Board

HLSB-37DI32A

User's Manual

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Revision history

Date	Version	Content	Note
SEP 2018	1.4E	Issued the first edition	

Preface

This manual describes HLSB-37DI32A, a general-purpose input board for HLS with two MKY37 slave ICs which is a kind of HLS family.

Be sure to read "HLS Introduction Guide" in advance to use HLSB-37DI32A and understand this manual.

- Target readers

- Those who first build an HLS
- Those who first use StepTechnica's HLSB-37DI32A to build an HLS

- Prerequisites

This manual assumes that you are familiar with :

- Network technology
- Semiconductor products (especially microcontrollers and memory)

- Related manuals

- HLS Introduction Guide
- HLS Technical Guide
- MKY36 User's Manual
- MKY37 User's Manual

【Note】

Some terms in this manual are different from those that used in our website or product brochures. The brochure uses ordinary terms to help many people in various industries understand our products.

Expertise in HLS family, please understand technical information based on technical documents (manuals).

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1 Outline

HLSB-37DI32A is a general-purpose input board for HLS with two MKY37 IC chips. This product has 32 external inputs isolated by photocoupler.

This product is powered from 24V external power supply, which is isolated by DC/DC converter on the board and operates with 5.0V inside circuit.

This board fits on DIN rail with cover equipped. Type name of the product with case is 'HLSB-37IO32A-C'.

2 Specifications

The specifications of HLSB-37DI32A is shown in Table 2-1.

Table 2-1 HLSB-37DI32A board specifications

Type	HLSB-37DI32A (With case : HLSB-37DI32A-C)		
HLS device	Two MKY37 ICs		
HLS communication mode	Full-duplex / Half-duplex		
HLS communication rate	12M/6M/3Mbps (Set with DIP switches)		
HLS termination resistor	100 Ω (Enable or Disable can be selected.)		
General-purpose input method and number of inputs	Current source type by photocoupler isolation : 32 inputs		
General inputs ON/OFF delay	100μs or lower		
LED	POWER (Green)	+5.0V power supply	
	MON (Green)	MKY37 MON	
	DI (Green)	DIN data	32 pcs
Switch	HLS termination setting switch HLS SA setting switch HLS communication rate setting switch HLS communication method setting switch		
Connector	HLS communication connector (RJ-45 type)		2 pcs
	General-purpose input connector (MIL type)		2 pcs
	Power supply connector (SPTA1/4-3,5 PHOENIX)		
Outside dimensions	64mm × 130mm		
Weight	70g (typ.)		
Operating temperature	Temperature	0°C to 55°C	
	Humidity	0% to 90% (With no condensation)	
Storage temperature	Temperature	-20°C to 65°C	
	Humidity	0% to 90% (With no condensation)	

External circuit power supply	DC24V +10% , -15%
Internal circuit power supply	DC/ DC converter isolates DC24V external power supply into DC5.0V internal operating voltage.
Consumption current (DC24V power supply)	250mA or lower

3 Block diagram

The block diagram of HLSB-37DI32A is shown in Fig. 3-1.

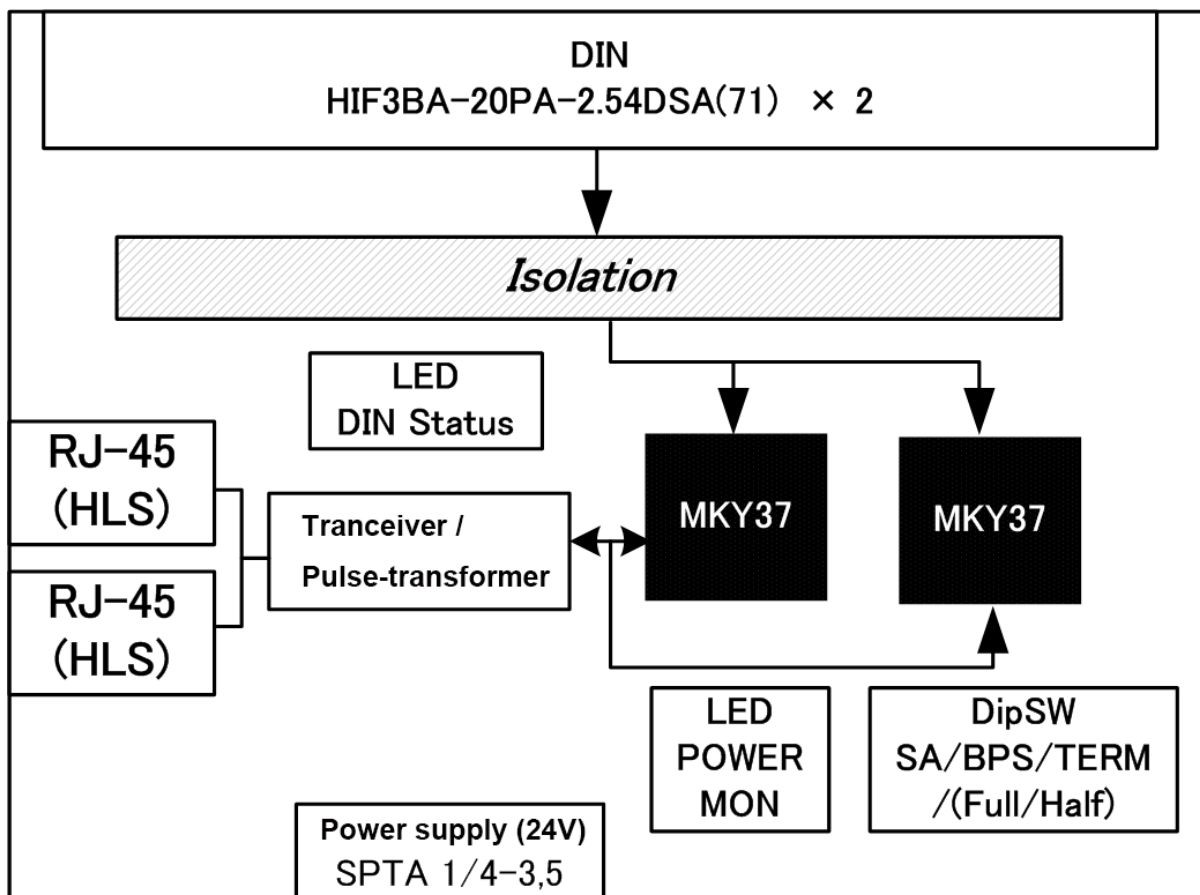


Fig. 3-1 Block diagram of HLSB-37DI32A

4 Functions

This chapter describes functions of HLSB-37DI32A.

4.1 MKY37 (HLS slave device)

This board mounts two MKY37 chips, slave ICs for HLS.

Although MKY37 can control 16 inputs / outputs as external I/O, only inputs are used on this board.

Also, general-purpose inputs have digital filtering function.

For details of MKY37, refer to "MKY37 User's Manual".

4.2 HLS communication

HLSB-37DI32A equips RS485 transceiver (SN751177NS) and pulse transformer (SPT401-DMX) for HLS communication.

Full-duplex or half-duplex communication mode can be selected with switching SW4 and SW5.

Termination resistor (100 Ω) can be set enable / disable with DIP switches (SW2, 3).

For information, HLS communication using this product needs 2 nodes due to have two MKY37 ICs mounted.

For this reason, SA=2 to 62 are enabled in SA (Satellite Address) settings of the board.

4.3 General-purpose inputs

HLSB-37DI32A supports 32 general-purpose input signals. Each input signals are isolated by photocoupler and connected to HLS slave IC (MKY37). The input method is current source type, which can be connected to switches and sensors.

Input equivalent circuit diagram is shown in Fig. 4-1.

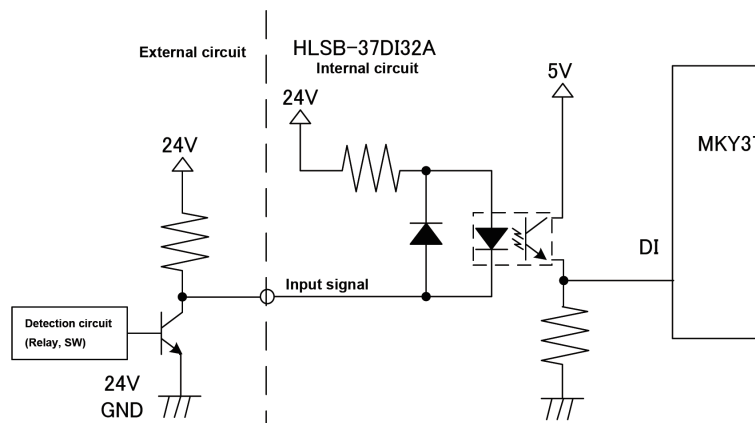


Fig. 4-1 Input equivalent circuit

5 External view

External view of HLSB-37DI32A is shown in Fig. 5-1.

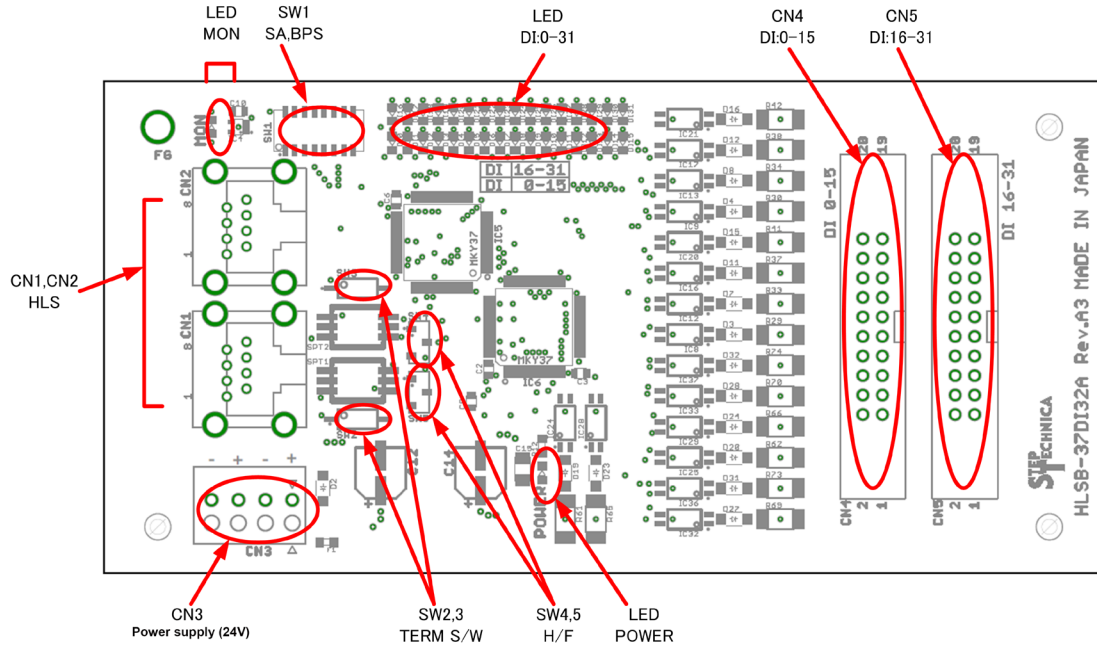


Fig. 5-1 External view

6 Switches

This chapter describes the switches of HLSB-37DI32A.

HLSB-37DI32A equips the following DIP switches.

- HLS SA (Satellite Address) , communication rate setting switch (SW1)
- HLS communication method (full-duplex, half-duplex) setting switches (SW4, 5)
- HLS termination setting switch (SW2, 3)

6.1 HLS SA (Satellite Address) , communication rate setting switch (SW1)

HLS SA (Satellite Address) and HLS communication rate (BPS) can be set in SW1.

The structure of SW1 is shown in Fig. 6-1. This switch shifts to '1' when slides to ON direction, and shifts to '0' when slides to OFF.

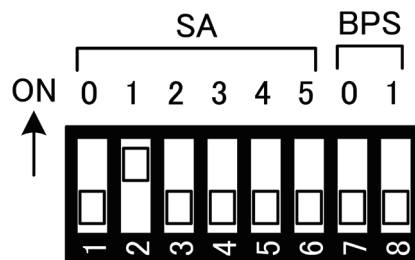


Fig. 6-1 HLS SA, communication rate setting switch (SW1)

SA (Station Address) of HLSB-37DI32A is set in SW1-2 to SW1-6.

SW1-1 has no meaning and function.

When '2' is set to SA of the board (same as Fig. 6-1), SA=2 and SA=3 are automatically allocated to each of two MKY37 ICs.

In this case, DI15-0 is allocated to SA=2 (an even address) and DI31-16 is allocated to SA=3 (an odd address) respectively.

Communication rate (BPS) is set in SW1-7 and SW1-8 (BPS) . are shown in Table 6-1.

Table 6-1 Settings of HLS communication rate

	State of SW1-7 (BPS0)	State of SW1-8 (BPS1)
12Mbps	OFF (0)	OFF (0)
6Mbps	ON (1)	OFF (0)
3Mbps	OFF (0)	ON (1)
Unused (Not to use)	ON (1)	ON (1)

Factory setting of SW2 is the following : SA=2, Communication rate (BPS) =12Mbps (Same as Fig. 6-1)

6.2 HLS communication mode (full-duplex, half-duplex) setting switches (SW4, SW5)

HLS communication mode of HLSB-37DI32A can be set in SW4 and SW5.

Be sure to set SW4 and SW5 same as each other.

Factory setting is full-duplex mode (2-3) . (Same as Fig. 6-2)



Fig. 6-2 HLS communication mode setting switches (SW4, SW5)

6.3 HLS termination setting switch (SW2, SW3)

Enable / disable of termination resistor can be set in SW2 and SW3.

When HLSB-37DI32A is connected as a termination of HLS, set the termination resistor ON (enable).

If HLSB-37DI32A is not connected as a termination, set termination resistor OFF (disable).

Termination ON (enable) state is shown in Fig. 6-3.

SW2 and SW3 must be the same setting.

Factory setting is termination ON (enable). (Same as Fig. 6-3)



Fig. 6-3 HLS termination setting switches (SW2, SW3)

7 LED

This chapter describes LEDs on HLSB-37DI32A.

This product equips the following LEDs.

- POWER Green Power supply (LED is lit during 5.0V is supplied.)
- MON Green LED is lit during HLS is operating.
- DI (31-0) Green This LED indicates the input signal from external device.
LED is lit when DI is high.

8 Connector

This chapter describes the specifications of connectors on HLSB-37DI32A.

HLSB-37DI32A equips the following connectors.

- Power supply connector (CN3)
- HLS communication connector (CN1, CN2)
- General-purpose input connectors (CN4, CN5)

8.1 Power supply connector (CN3)

CN3 is a power supply connector of HLSB-37DI32A, which to input DC24V. Connector pin assignment is shown in Table 8-1.

Connector manufacturer : Phoenix Contact Connector part number : SPTA1/4-3,5

Table 8-1 Power supply connector (CN3)

Pin #	Signal name
1	+24V
2	24V_GND
3	+24V
4	24V_GND

8.2 HLS communication connector (CN1, CN2)

CN1, CN2 are HLS communication connectors. Connector pin assignment is shown in Table 8-2.

CN1 and CN2 are the same pin assignment.

Connector manufacturer : Hirose Connector part number : TM11R-3C-88 (50) RJ-45 type

Table 8-2 HLS communication connector pin assignment (CN1, CN2)

Pin #	Signal name	
	Full-duplex	Half-duplex
1	-	-
2	-	-
3	TXD+	-
4	RXD-	TRX-
5	RXD+	TRX+
6	TXD-	-
7	-	-
8	Shield	Shield

8.3 General-purpose input connectors (CN4, CN5)

CN4 and CN5 are general-purpose input connectors. CN4 connector pin assignment is shown in Table 8-3, and CN5 is shown in Table 8-4. CN4 and CN5 are the same type.

Connector manufacturer : Hirose Connector part number : HIF3BA-20PA-2.54DSA (71) HIF (MIL) type

Table 8-3 General-purpose input (DI15-0) connector pin assignment (CN4)

Pin #	Signal name	Pin #	Signal name
1	DI_0	2	DI_1
3	DI_2	4	DI_3
5	DI_4	6	DI_5
7	DI_6	8	DI_7
9	DI_8	10	DI_9
11	DI_10	12	DI_11
13	DI_12	14	DI_13
15	DI_14	16	DI_15
17	24V_GND	18	24V_GND
19	+24V	20	+24V

Table 8-4 General-purpose input (DI31-16) connector pin assignment (CN5)

Pin #	Signal name	Pin #	Signal name
1	DI_16	2	DI_17
3	DI_18	4	DI_19
5	DI_20	6	DI_21
7	DI_22	8	DI_23
9	DI_24	10	DI_25
11	DI_26	12	DI_27
13	DI_28	14	DI_29
15	DI_30	16	DI_31
17	24V_GND	18	24V_GND
19	+24V	20	+24V

9 External dimensions

External dimensions of board is shown in Fig. 9-1 and external dimensions with case which supports DIN rail mounting is shown in Fig. 9-2.

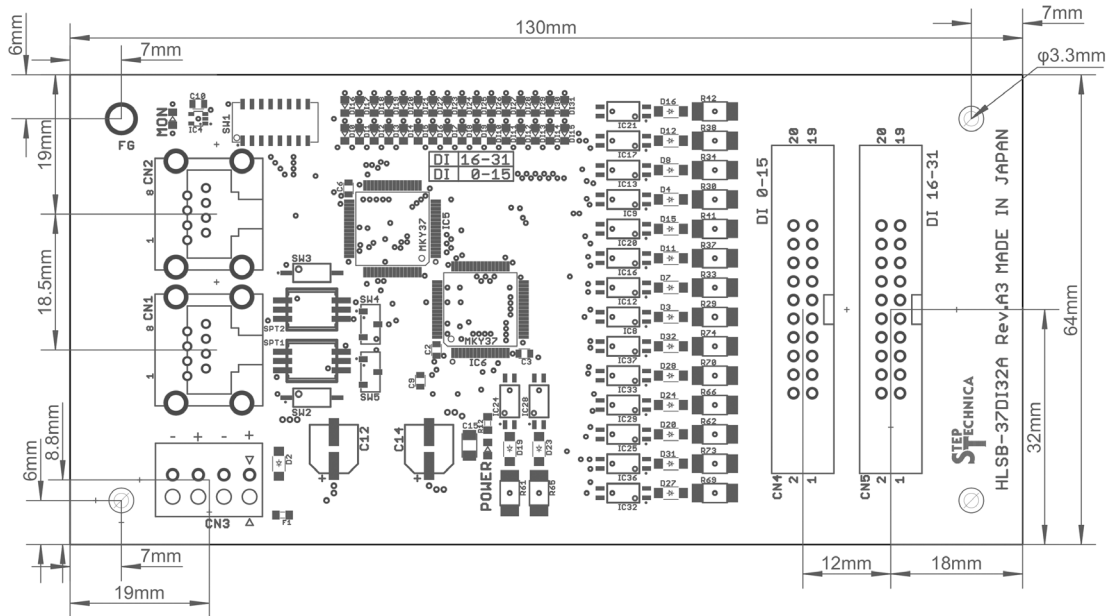


Fig. 9-1 External dimensions of board

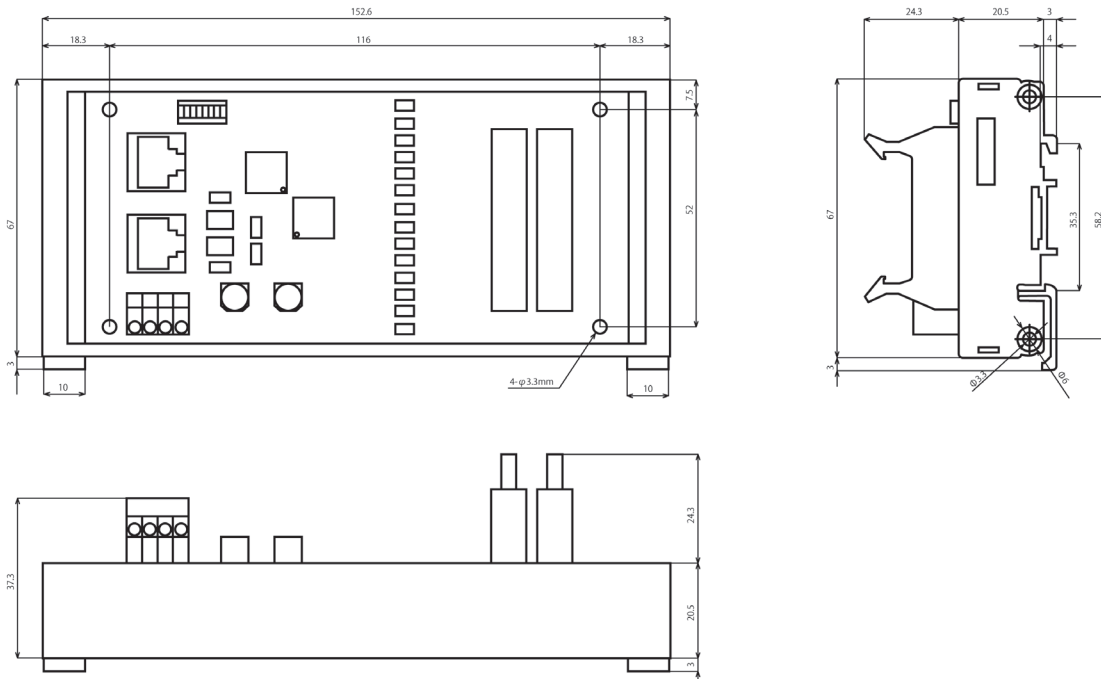


Fig. 9-2 External dimensions with case

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HLS (MKY37) Slave Board
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Document No. : STD_HLSB37DI32A_V1.4E
Issued : September 2018