

To our customers,

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H8/300L Series Option Board  
For H8/300L Series Low-Cost Emulator

Microcomputer Development Environment System

# User's Manual

2003.4



**Microcomputer Development Environment System**

**H8/300L Series Option Board  
For H8/300L Series Low-cost Emulator**

**H8/3857 Series Microcomputer**

**User's Manual**

**H8/300L Series Option Board for ALE300L Low-cost Emulator  
User's Manual**

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## PREFACE

This guide explains how to set-up and use the ALE300L option board for the H8/300L series of microcomputer.

- |                  |  |
|------------------|--|
| <b>Section 1</b> | Introduction<br>Gives an introduction to the system, package, specification and functions.   |
| <b>Section 2</b> | Installation<br>Explains how to setup and install ALE300L emulator and option board.<br>Target system connection is illustrated in this section too. |

### Related Manuals:

- H8S/H8/300 series C/C++ Compiler, Assembler, Optimizing Linkage Editor User's Manual
- H8/300L Series Hardware Manual

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## Section 1. Introduction

### 1.1 Overview

The ALE300L-3857 LCD Board is a part of ALE series of real time, ease-of-use, cost-effective support tools. This LCD board is designed to work with ALE300L-H8/3834 Emulator to support the development of the game application with dot-matrix LCD.

HDI (Hitachi Debugging Interface) for ALE300L-H8/3857 LCD Board follows the HDI families of software, providing uniform Graphical User Interface across Renesas option boards. It inherits the usual user-friendly environment of a general MS-Window based program, providing on-line help and emulation commands by clicking the mouse buttons.

### 1.2 Package

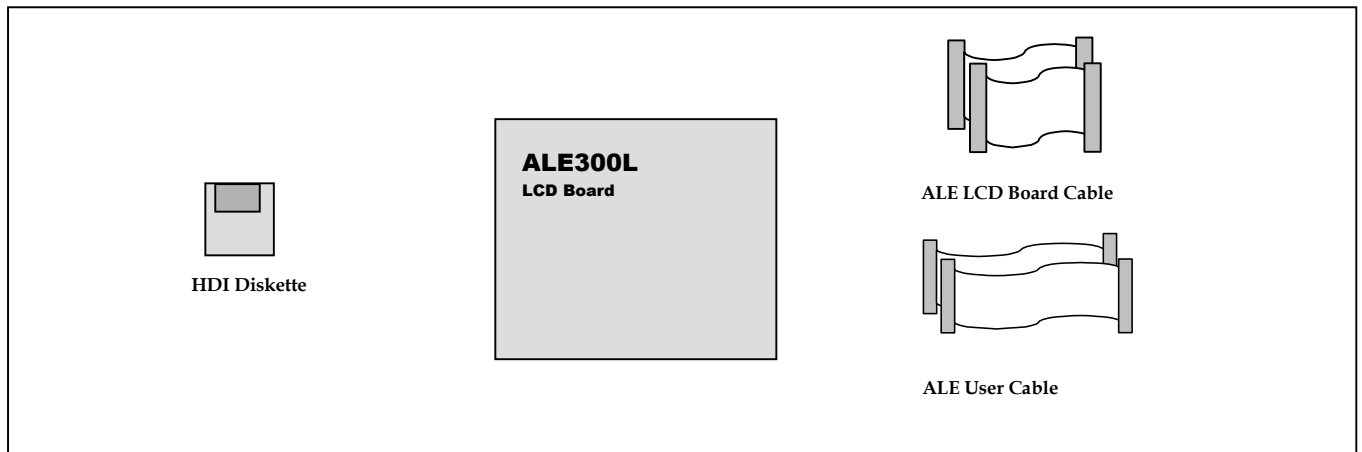


Figure 1-1 ALE300L-H8/3857 LCD Board Package

#### 1.2.1 Software Components

The software components included in the package are listed below.

- 1 x HDI Installation Disk
  - Setup.exe

#### 1.2.2 Hardware Components

The hardware components included in the package are listed below.

- 1 x ALE300L-H8/3857 LCD Board
- 3 x ALE User Cables
- 2 x ALE LCD Board Cables

## 1.3 Specifications

Table 1-1 ALE300L Specification

ITEM	SPECIFICATION
<b>Emulation</b>	<ul style="list-style-type: none"> <li>• Performs real-time emulation of a target program</li> <li>• Performs single step execution</li> <li>• Supports real-time emulation up to the MCU's maximum frequency: 5 MHz</li> <li>• Displays PC address and LCD board mode status (Idle, Run) during run</li> <li>• Modifies and displays MCU registers</li> <li>• Resets MCU</li> </ul>
<b>File</b>	<ul style="list-style-type: none"> <li>• Loads target program (Sysprof or Motorola S-type format)</li> <li>• Saves target program</li> </ul>
<b>Memory functions</b>	<ul style="list-style-type: none"> <li>• Modifies and displays memory contents (including memory mapped peripheral registers)</li> <li>• Dumps a range of memory contents</li> <li>• Fills data with specified pattern</li> <li>• Standard 64K high-speed emulation memory (zero wait state)</li> <li>• Specifies memory attribute: ROM / Guarded</li> </ul>
<b>Breakpoint</b>	<ul style="list-style-type: none"> <li>• 256 maximum PC breakpoints</li> <li>• 1 combination break-point on: <ul style="list-style-type: none"> <li>• address</li> <li>• data</li> <li>• data access type (Read / Write)</li> </ul> </li> <li>• 2 external probes</li> <li>• Write protect break - when writing into the MCU's ROM area</li> <li>• Access-inhibit break - when accessing MCU's Guarded area</li> <li>• Forced break - Host PC ESC key</li> </ul>
<b>Trace</b>	<ul style="list-style-type: none"> <li>• Trace memory size: 48 bits x 32K bus cycles</li> <li>• 24 bit address bus (16 bit valid for H8/300L)</li> <li>• 16 bit data bus</li> <li>• 1 bit user NMI</li> <li>• 2 bit external probe signal</li> <li>• MCU control signal (R/W, operating mode, IACK signal, interrupt flag)</li> <li>• Other emulation controls signals (e.g. LIR)</li> <li>• Displays mnemonics of instructions being executed during emulation.</li> <li>• Searches for specified trace information: address, data</li> </ul>
<b>Execution Time Measurement</b>	<ul style="list-style-type: none"> <li>• Resolution : 0.32 usec</li> <li>• Maximum measuring time : 22.9 mins</li> </ul>
<b>Single step</b>	<ul style="list-style-type: none"> <li>• Executes target program in step/s.</li> </ul>
<b>Clock selection</b>	<ul style="list-style-type: none"> <li>• Four kinds of main clocks are hardware selectable: <ul style="list-style-type: none"> <li>• User system main clock - via ALE user cable</li> <li>• LCD Board main clock - inside ALE main unit</li> <li>• External clock - via external clock cable</li> </ul> </li> <li>• Two kinds of sub clocks are hardware selectable: <ul style="list-style-type: none"> <li>• User system sub-clock - via ALE user cable</li> <li>• LCD Board 32.8KHz - on Extension Board</li> </ul> </li> </ul>
<b>User voltage</b>	<ul style="list-style-type: none"> <li>• Support : 3.0 ~ 5.5 Volts (depends on Main Clock Frequency)</li> </ul>
<b>Auto ID detect</b>	<ul style="list-style-type: none"> <li>• Detects the EV chip's ID code</li> </ul>

## Section 2. Installation

### 2.1 ALE300L-H8/3834 Emulator Setup

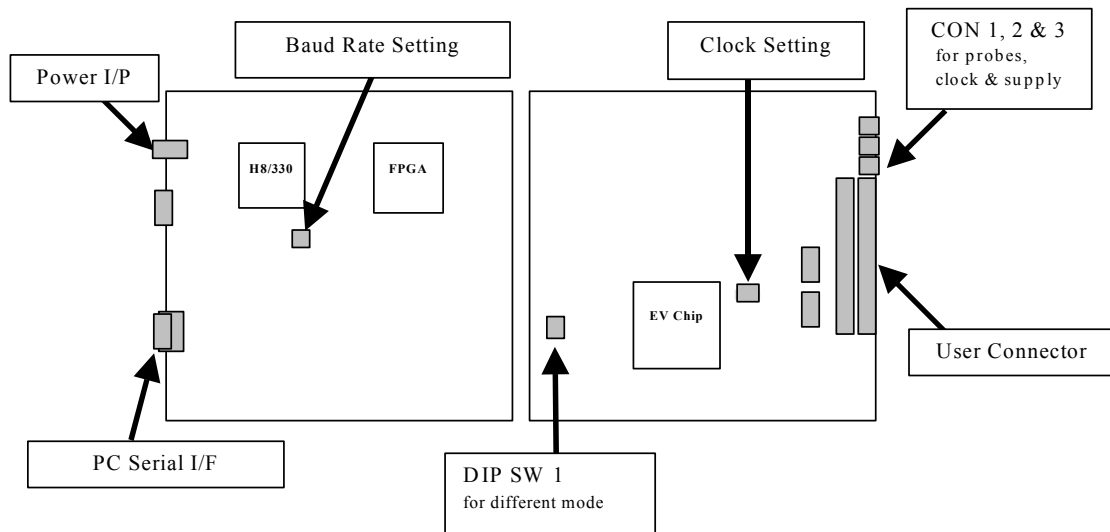


Figure 2-1 Layout of Switches & Connector

#### 2.1.1 Clock Settings For ALE300L-H8/3834 Emulator

Table 2-1 Jumper Settings for clock selections

Sub Clock Selection		INT	TGT	
External clock		On	-	
Main Clock Selection		INT	EXT	TGT
LCD Board Internal clock (10MHz)		On	Off	-

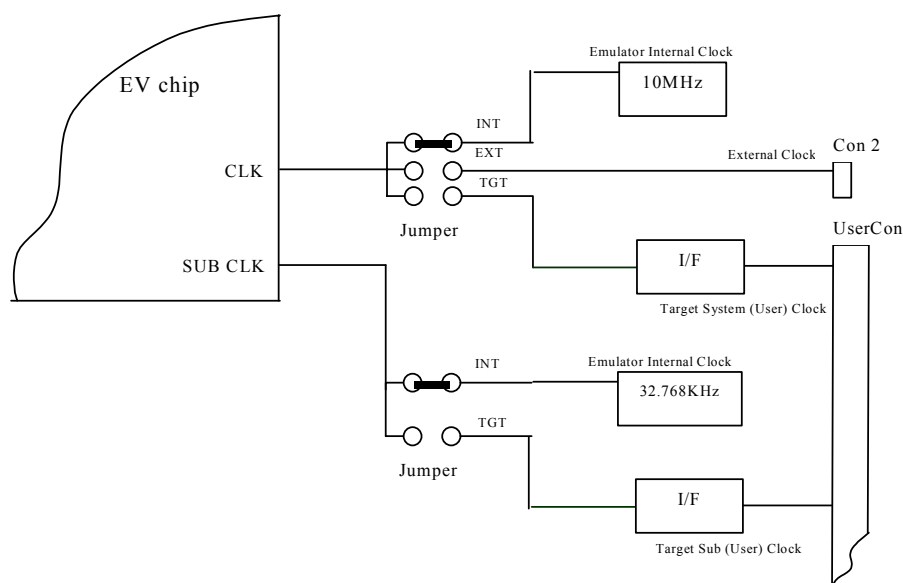


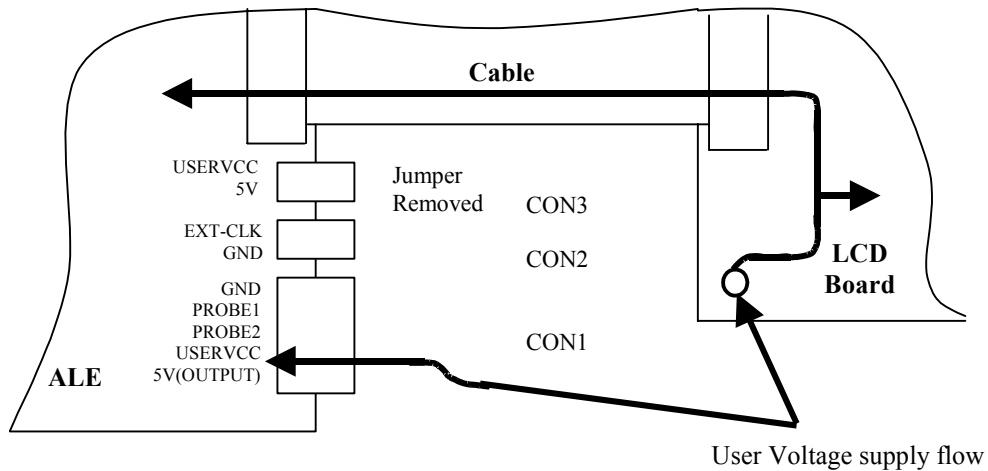
Figure 2-2 Clock input setting

## 2.1.2 User Power Supply

This is the actual supply (UserVCC) that user wants the target application to operate at.

**Note** : 5V is supplied to the LCD board through the ALE emulator, and UserVCC is supplied from the LCD board to the emulator, in which the user target system is supposed to be run at.

The emulated MCU and target system will be running at UserVCC ie. Drawing power from User target system. The voltage range of UserVCC will depend on the actual MCU's specification. Generally, ALE300L can support 3.0 – 5.5 Volts.



**Figure 2-3 With Target connected running at UserVcc**

**Note:** Ensure that the jumper is removed if a target voltage (3.0~ 5.5 Volts) is input into UserVcc pin. If otherwise, UserVcc will be shorted to VCC (5 Volts), which may cause damages to the LCD Board.

### 2.1.3 Interface Between ALE300L-H8/3834 Emulator and ALE300L-H8/3857 LCD Board

The ALE300L-H8/3834 Emulator is interfaced with the ALE300L-H8/3857 LCD Board by means of 2 60-ways Ribbon Cable. The Emulator Connector USERCON1 and USERCON2 are connected the LCD Board Connector CN1 and CN2 respectively. Table 2-2 describes the Output Connector Pin assignment of the ALE300L-H8/3834 Emulator and the Input Connector Pin assignment of the H8/300L-H8/3857 LCD Board.

**Table 2-2 Pin Assignment of USERCON1& 2 and CN1 & 2**

ALE300L-H8/3834 ALE-60P (USERCON1)		ALE300L-H8/3857 LCD Board EB-60P (CN 1)		ALE300L-H8/3834 ALE-60P (USERCON2)		ALE300L-H8/3857 LCD Board EB-60P (CN 2)	
Pin No	Description	Pin No	Description	Pin No	Description	Pin No	Description
1	P40	1	P40	1	P70	1	P70
2	P41	2	P41	2	P71	2	P71
3	P42	3	P42	3	P72	3	P72
4	GND	4	GND	4	P73	4	P73
5	P43	5	P43	5	P74	5	P74
6	AVCC	6	AVCC	6	P75	6	P75
7	GND	7	GND	7	P76	7	P76
8	PB0/AN0	8	PB0/AN0	8	P77	8	P77
9	PB1/AN1	9	PB1/AN1	9	GND	9	GND
10	GND	10	GND	10	P80	10	P80
11	PB2/AN2	11	PB2/AN2	11	P81	11	P81
12	PB3/AN3	12	PB3/AN3	12	P82	12	P82
13	GND	13	GND	13	P83	13	P83
14	PB4/AN4	14	PB4/AN4	14	P84	14	P84
15	PB5/AN5	15	PB5/AN5	15	P85	15	P85
16	GND	16	GND	16	P86	16	P86
17	PB6/AN6	17	PB6/AN6	17	P87	17	P87
18	PB7/AN7	18	PB7/AN7	18	GND	18	GND
19	GND	19	GND	19	P90-V	19	P90-V
20	PC0/AN8	20	PC0/AN8	20	P91	20	P91
21	PC1/AN9	21	PC1/AN9	21	P92	21	P92
22	GND	22	GND	22	P93	22	P93
23	PC2/AN10	23	PC2/AN10	23	P94	23	P94
24	PC3/AN11	24	PC3/AN11	24	P95	24	P95
25	GND	25	GND	25	P96	25	P96
26	-	26	-	26	P97	26	P97
27	GND	27	GND	27	GND	27	GND
28	OSC1	28	OSC1	28	USERVCC	28	USERVCC
29	GND	29	GND	29	P10	29	P10
30	/RES	30	/RES	30	P11	30	P11
31	MD0-V	31	MD0-V	31	P12	31	P12
32	GND	32	GND	32	P13	32	P13



33	P20	33	P20	33	P14	33	P14
34	P21	34	P21	34	P15	34	P15
35	P22	35	P22	35	P16	35	P16
36	P23	36	P23	36	P17	36	P17
37	P24	37	P24	37	GND	37	GND
38	P25	38	P25	38	NC	38	NC
39	P26	39	P26	39	P37	39	P37
40	P27	40	P27	40	P36	40	P36
41	GND	41	GND	41	P35	41	P35
42	PA6-V	42	PA6-V	42	P34	42	P34
43	P50	43	P50	43	P33	43	P33
44	P51	44	P51	44	P32	44	P32
45	P52	45	P52	45	P31	45	P31
46	P53	46	P53	46	P30	46	P30
47	P54	47	P54	47	GND	47	GND
48	P55	48	P55	48	PA5-V	48	PA5-V
49	P56	49	P56	49	PA4-V	49	PA4-V
50	P57	50	P57	50	PA3	50	PA3
51	GND	51	GND	51	PA2	51	PA2
52	P60	52	P60	52	PA1	52	PA1
53	P61	53	P61	53	PA0	53	PA0
54	P62	54	P62	54	GND	54	GND
55	P63	55	P63	55	V1-V	55	V1-V
56	P64	56	P64	56	GND	56	GND
57	P65	57	P65	57	V2-V	57	V2-V
58	P66	58	P66	58	GND	58	GND
59	P67	59	P67	59	V3-V	59	V3-V
60	GND	60	GND	60	GND	60	GND

## 2.2 ALE300L-H8/3857 LCD Board Setup

### 2.2.1 Clock Settings for ALE300L-H8/3857 LCD Board

Table 2-3 Jumper Settings for clock selections

Sub Clock Selection	S1	
	1-2	2-3
LCD Board's 10 MHz	Short	Open
Target Main Clock	Open	Short
LCD Board's Sub Clock	-	-

### 2.2.1.1. Interface Between ALE300L-H8/3857 LCD Board and User System

The ALE300L-H8/3857 LCD Board is connected to the Adapter Board by means of 3 50-ways KEL Ribbon Cable. The LCD Board CN3, CN4 and CN5 are connected to the Adapter Board UCON1, UCON2 and UCON3 respectively. Table 2-4 describes the Output Connector Pin assignment of the H8300L-H8/3857 LCD Board and the Input Connector Pin assignment of the Adapter Board.

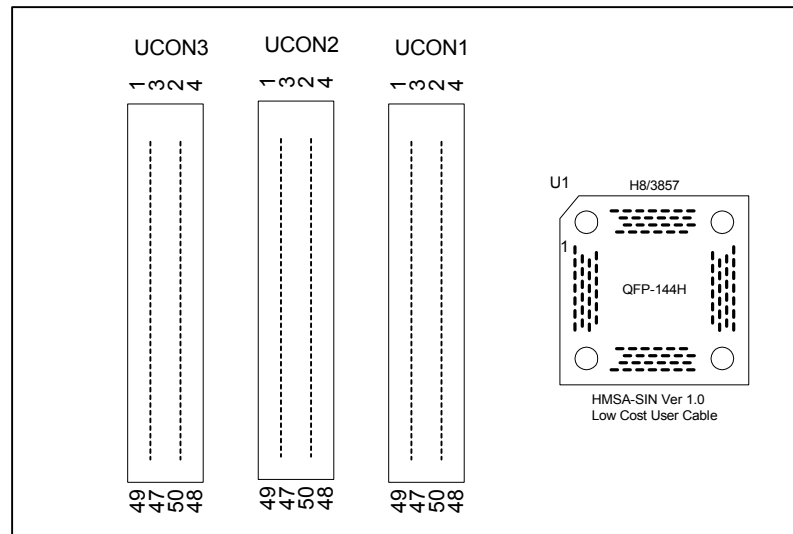
**Table 2-4 Pin Assignment of CN1, 2 & 3 and UCON1, 2 & 3**

LCD Board Connector, CN3				User Cable Connector, UCON 1			
Pin No	Description	Pin No	Description	Pin No	Description	Pin No	Description
1	GND	31	P27	1	GND	31	P27
2	GND	32	P14	2	GND	32	P14
3	UVCC	33	GND	3	UVCC	33	GND
4	UVCC	34	P15	4	UVCC	34	P15
5	NC	35	P30	5	NC	35	P30
6	P50	36	P16	6	P50	36	P16
7	X1	37	P31	7	X1	37	P31
8	P51	38	P17	8	P51	38	P17
9	GND	39	P32	9	GND	39	P32
10	P52	40	P40	10	P52	40	P40
11	OSC1	41	P33	11	OSC1	41	P33
12	P53	42	P41	12	P53	42	P41
13	NC	43	P34	13	NC	43	P34
14	P54	44	P42	14	P54	44	P42
15	/RES	45	P35	15	/RES	45	P35
16	P55	46	P43/IRQ0	16	P55	46	P43/IRQ0
17	P36	47	P36	17	P20	47	P36
18	P56	48	AVCC	18	P56	48	AVCC
19	P21	49	P37	19	P21	49	P37
20	P57	50	GND	20	P57	50	GND
21	P22	51	-	21	P22	51	-
22	NC	52	-	22	NC	52	-
23	P23	53	-	23	P23	53	-
24	P10	54	-	24	P10	54	-
25	P24	55	-	25	P24	55	-
26	P11	56	-	26	P11	56	-
27	P25	57	-	27	P25	57	-
28	P12	58	-	28	P12	58	-
29	P26	59	-	29	P26	59	-
30	P13	60	-	30	P13	60	-

LCD Board Connector, CN4				User Cable Connector, UCON 2			
Pin No	Description	Pin No	Description	Pin No	Description	Pin No	Description
1	PB0	31	COM7	1	PB0	31	COM7
2	GND	32	SEG15	2	GND	32	SEG15
3	PB1	33	COM8	3	PB1	33	COM8
4	SEG1	34	SEG16	4	SEG1	34	SEG16
5	PB2	35	COM9	5	PB2	35	COM9
6	SEG2	36	SEG17	6	SEG2	36	SEG17
7	PB3	37	COM10	7	PB3	37	COM10
8	SEG3	38	SEG18	8	SEG3	38	SEG18
9	PB4	39	COM11	9	PB4	39	COM11
10	SEG4	40	SEG19	10	SEG4	40	SEG19
11	PB5	41	COM12	11	PB5	41	COM12
12	SEG5	42	SEG20	12	SEG5	42	SEG20
13	PB6	43	COM13	13	PB6	43	COM13
14	SEG6	44	SEG21	14	SEG6	44	SEG21
15	PB7	45	COM14	15	PB7	45	COM14
16	SEG7	46	SEG22	16	SEG7	46	SEG22
17	GND	47	COM15	17	GND	47	COM15
18	SEG8	48	SEG23	18	SEG8	48	SEG23
19	COM1	49	COM16	19	COM1	49	COM16
20	SEG9	50	SEG24	20	SEG9	50	SEG24
21	COM2	51	-	21	COM2	51	-
22	SEG10	52	-	22	SEG10	52	-
23	COM3	53	-	23	COM3	53	-
24	SEG11	54	-	24	SEG11	54	-
25	COM4	55	-	25	COM4	55	-
26	SEG12	56	-	26	SEG12	56	-
27	COM5	57	-	27	COM5	57	-
28	SEG13	58	-	28	SEG13	58	-
29	COM6	59	-	29	COM6	59	-
30	SEG14	60	-	30	SEG14	60	-

LCD Board Connector, CN5				User Cable Connector, UCON 3			
Pin No	Description	Pin No	Description	Pin No	Description	Pin No	Description
1	SEG25	31	SEG40	1	SEG25	31	SEG40
2	COM24	32	V34	2	COM24	32	V34
3	SEG26	33	GND	3	SEG26	33	GND
4	COM23	34	V3	4	COM23	34	V3
5	SEG27	35	COM32	5	SEG27	35	COM32
6	COM22	36	VCI	6	COM22	36	VCI
7	SEG28	37	COM31	7	SEG28	37	COM31
8	COM21	38	C2-	8	COM21	38	C2-
9	SEG29	39	COM30	9	SEG29	39	COM30
10	COM20	40	C2+	10	COM20	40	C2+
11	SEG30	41	COM29	11	SEG30	41	COM29
12	COM19	42	C1-	12	COM19	42	C1-
13	SEG31	43	COM28	13	SEG31	43	COM28
14	COM18	44	C1+	14	COM18	44	C1+
15	SEG32	45	COM27	15	SEG32	45	COM27
16	COM17	46	VLOUT	16	COM17	46	VLOUT
17	SEG33	47	COM26	17	SEG33	47	COM26
18	GND	48	VLCD	18	GND	48	VLCD
19	SEG34	49	COM25	19	SEG34	49	COM25
20	V5OUT	50	GND	20	V5OUT	50	GND
21	SEG35	51	-	21	SEG35	51	-
22	V4OUT	52	-	22	V4OUT	52	-
23	SEG36	53	-	23	SEG36	53	-
24	V2OUT	54	-	24	V2OUT	54	-
25	SEG37	55	-	25	SEG37	55	-
26	V1OUT	56	-	26	V1OUT	56	-
27	SEG38	57	-	27	SEG38	57	-
28	V4	58	-	28	V4	58	-
29	SEG39	59	-	29	SEG39	59	-
30	V34	60	-	30	V34	60	-

### 2.2.1.2. Adapter Board



**Top View of 144H User Cable (Top View)**

**Figure 2-4 User Cable**

Basically, the 3 50-way KEL Connectors on the Adapter Board are routed to the adapter and Table 2-5 shows the pin assignment of the adapter.

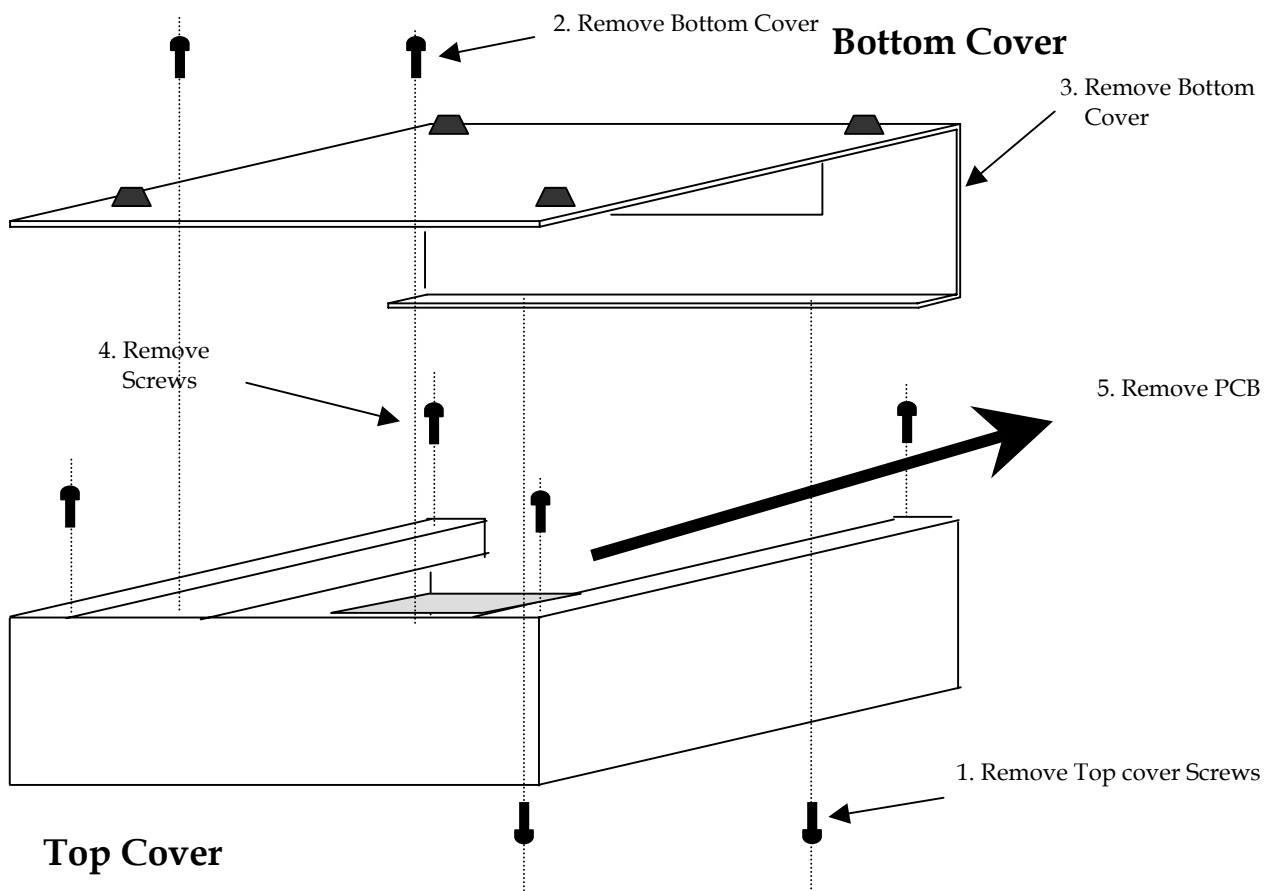
**Table 2-5 Pin Assignment of FP-144H**

FP-144H							
Pin No	Description	Pin No	Description	Pin No	Description	Pin No	Description
1	P57/WKP7	37	COM1	73	SEG21	109	V5OUT
2	P56/WKP6	38	COM2	74	SEG22	110	V4OUT
3	P55/WKP5	39	COM3	75	SEG23	111	V3OUT
4	P54/WKP4	40	COM4	76	SEG24	112	V2OUT
5	P53/WKP3	41	COM5	77	SEG25	113	V1OUT
6	P52/WKP2	42	COM6	78	SEG26	114	V4
7	P51/WKP1	43	COM7	79	SEG27	115	V34
8	P50/WKP0	44	COM8	80	SEG28	116	V3
9	P27	45	COM9/SEG64	81	SEG29	117	VCI
10	P26	46	COM10/SEG63	82	SEG30	118	C2-
11	P25	47	COM11/SEG62	83	SEG31	119	C2+
12	P24	48	COM12/SEG61	84	SEG32	120	C1-
13	P23	49	COM13/SEG60	85	SEG33	121	C1+
14	P22	50	COM14/SEG59	86	SEG34	122	VLOUT
15	P21/UD	51	COM15/SEG8	87	SEG35	123	VLCD
16	P20/IRQ/ADTRQ	52	COM16/SEG57	88	SEG36	124	GND

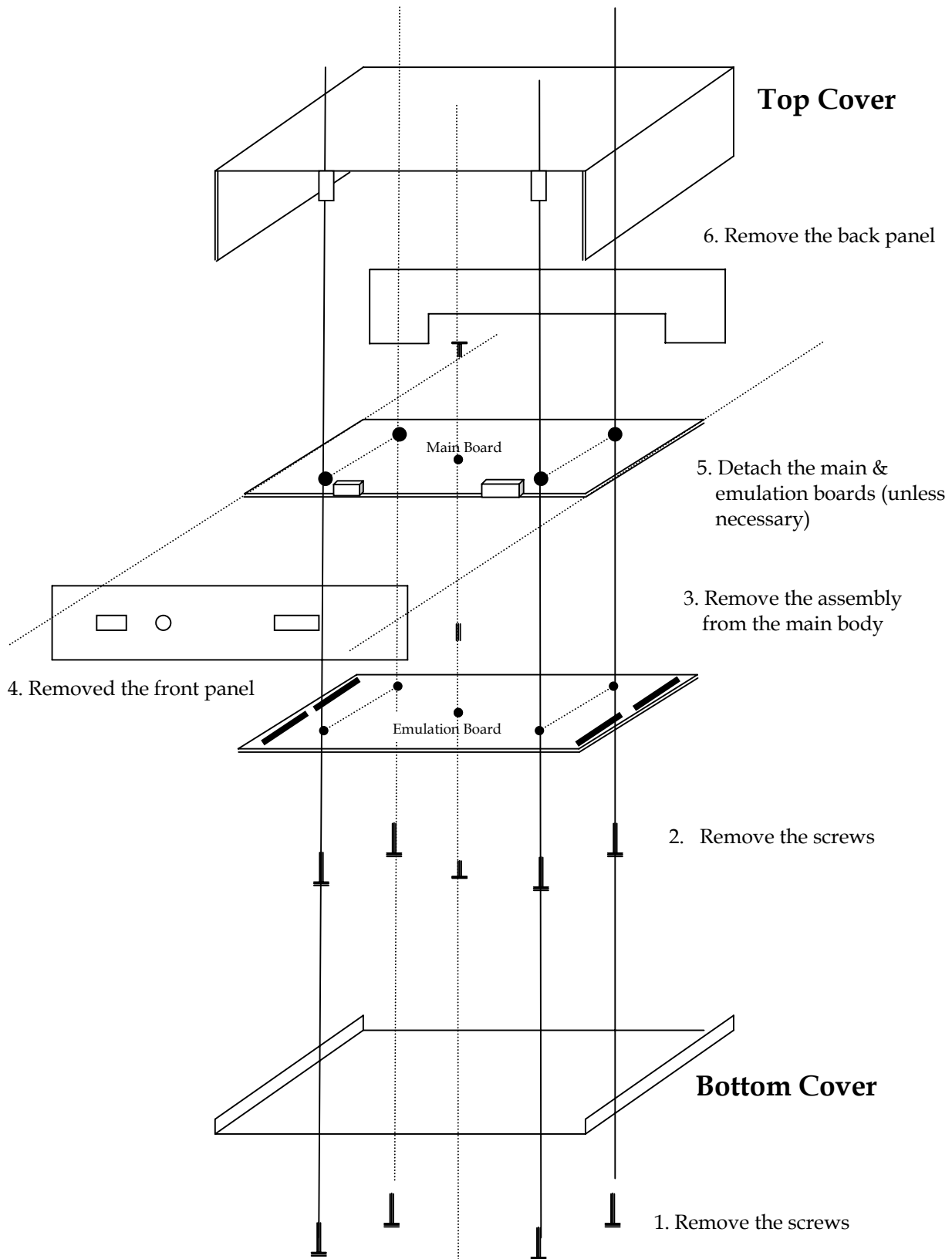
17	AVCC	53	SEG1	89	SEG37	125	P37
18	PB0/AN0	54	SEG2	90	SEG38	126	P36
19	PB1/AN1	55	SEG3	91	SEG39	127	P35
20	PB2/AN2	56	SEG4	92	SEG40	128	P34
21	PB3/AN3	57	SEG5	93	COM32/SEG41	129	P33
22	PB4/AN4	58	SEG6	94	COM31/SEG42	130	P32/SO1
23	PB5/AN5	59	SEG7	95	COM30/SEG43	131	P31/SI1
24	PB6/AN6	60	SEG8	96	COM29/SEG44	132	P30/SCK1
25	PB7/AN7	61	SEG9	97	COM28/SEG45	133	P17/IRQ3/TMIF
26	GND	62	SEG10	98	COM27/SEG46	134	P16/IRQ2/TMIC
27	X2	63	SEG11	99	COM26/SEG47	135	P15/IRQ1/TMIB
28	X1	64	SEG12	100	COM25/SEG48	136	P14/PWM
29	GND	65	SEG13	101	COM24/SEG49	137	P13
30	OSC2	66	SEG14	102	COM23/SEG50	138	P12/TMOFH
31	OSC1	67	SEG15	103	COM22/SEG51	139	P11/TMOFL
32	TEST	68	SEG16	104	COM21/SEG52	140	P10/TMOW
33	TEST2	69	SEG17	105	COM20/SEG53	141	P43/IRQ0
34	UVCC	70	SEG18	106	COM19/SEG54	142	P42/TXD
35	/RES	71	SEG19	107	COM18/SEG55	143	P41/RXD
36	FWE	72	SEG20	108	COM17/SEG56	144	P40/SCK3

## APPENDIX A: ALE300L Emulator Assembly

### Assembly for Type 2

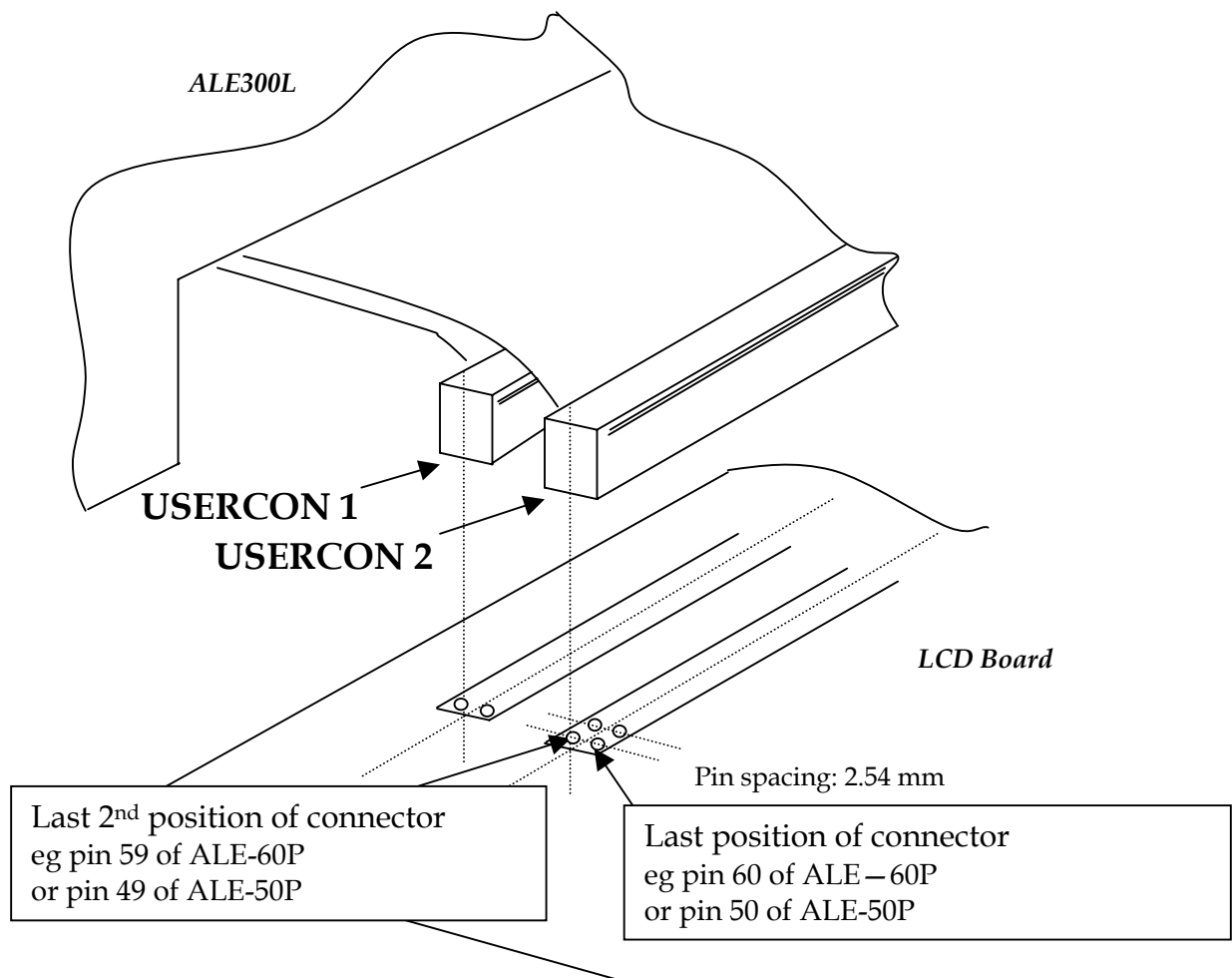


## Assembly for Type 1





## APPENDIX B: ALE300L LCD Board Connector Layout



## **Renesas Technology (Asia Sales Offices)**

URL: <http://www.renesas.com>

H8/300L Series Option Board



Renesas System Solutions Asia Pte. Ltd.