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April 1st, 2010
Renesas Electronics Corporation

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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**

**H8/3937 Series Microcomputer (Non-roaming)
H8/3937R Series Microcomputer (Roaming)**

User's Manual

H8/300L Series Option Board for ALE300L Low-cost Emulator

User's Manual

Published by : Renesas System Solutions Asia Pte. Ltd.

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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.

Section 1 Introduction

Gives an introduction to the system, package, specification and functions.

Section 2 Installation

Explains how to setup and install ALE300L emulator and option board.

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-H8/3937(R) Flex Decoder Board is a part of ALE series of real time, ease-of-use and cost-effective support tools. This optional board is designed to work with ALE300L-H8/3880R emulator to support the development of flex pager.

HDI (Hitachi Debugging Interface) for ALE300L emulator follows the HDI families of software, providing uniform Graphical User Interface across Renesas emulators. It inherits the usual user-friendly environment of a general MS-Windows based program, providing on-line help and emulation commands by clicking the mouse buttons.

1.2 Package

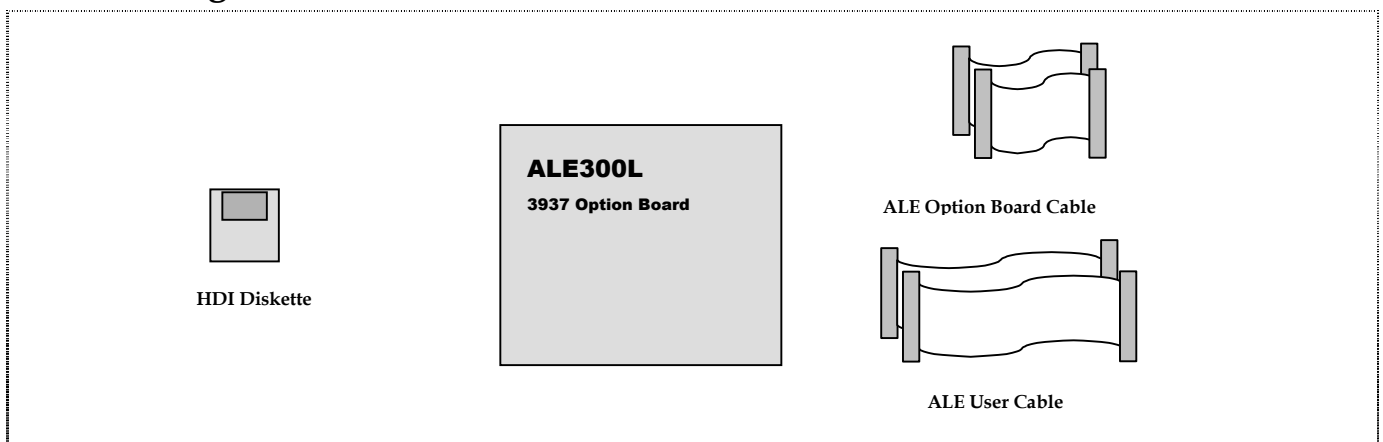


Figure 1-1 ALE300L-H8/3937(R) Flex Decoder Board Package

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 Option Board
- 2 x ALE User Cables
- 2 x ALE Option Board Cables

1.3 Specifications

Table 1-1 ALE300L Specification

ITEM	SPECIFICATION
Emulation	<ul style="list-style-type: none"> • Performs real-time emulation of a target program • Performs single step execution • Supports real-time emulation up to the MCU's maximum frequency: 5 MHz • Displays PC address and emulator mode status (Idle, Run) during run • Modifies and displays MCU registers • Resets MCU
File	<ul style="list-style-type: none"> • Loads target program (Sysprof or Motorola S-type format) • Saves target program
Memory functions	<ul style="list-style-type: none"> • Modifies and displays memory contents (including memory mapped peripheral registers) • Dumps a range of memory contents • Fills data with specified pattern • Standard 64K high-speed emulation memory (zero wait state) • Specifies memory attribute: ROM / Guarded
Breakpoint	<ul style="list-style-type: none"> • 256 maximum PC breakpoints • 1 combination break-point on: <ul style="list-style-type: none"> • address • data • data access type (Read / Write) • 2 external probes <ul style="list-style-type: none"> • Write protect break - when writing into the MCU's ROM area • Access-inhibit break - when accessing MCU's Guarded area • Forced break - Host PC ESC key
Trace	<ul style="list-style-type: none"> • Trace memory size: 48 bits x 32K bus cycles • 24 bit address bus (16 bit valid for H8/300L) • 16 bit data bus • 1 bit user NMI • 2 bit external probe signal • MCU control signal (R/W, operating mode, IACK signal, interrupt flag) • Other emulation controls signals (e.g. LIR) • Displays mnemonics of instructions being executed during emulation. • Searches for specified trace information: address, data
Execution Time Measurement	<ul style="list-style-type: none"> • Resolution : 0.32 usec • Maximum measuring time : 22.9 mins
Single step	<ul style="list-style-type: none"> • Executes target program in step/s.
Clock selection	<ul style="list-style-type: none"> • Four kinds of main clocks are hardware selectable: <ul style="list-style-type: none"> • User system clock - via ALE user cable • Emulator internal clock - inside ALE main unit • External clock - via external clock cable • Option Board clock - on Option Board • Three kinds of sub clocks are hardware selectable: <ul style="list-style-type: none"> • User sub-clock - via ALE user cable • Option Board 76.8KHz - on Option Board • Option Board 160KHz - on Option Board
User voltage	<ul style="list-style-type: none"> • Support : 1.8 ~ 3.6 Volts (depends on Main Clock Frequency)
Auto ID detect	<ul style="list-style-type: none"> • Detects the EV chip's ID code

Section 2. Installation

2.1 ALE300L-H8/3880R Emulator Setup

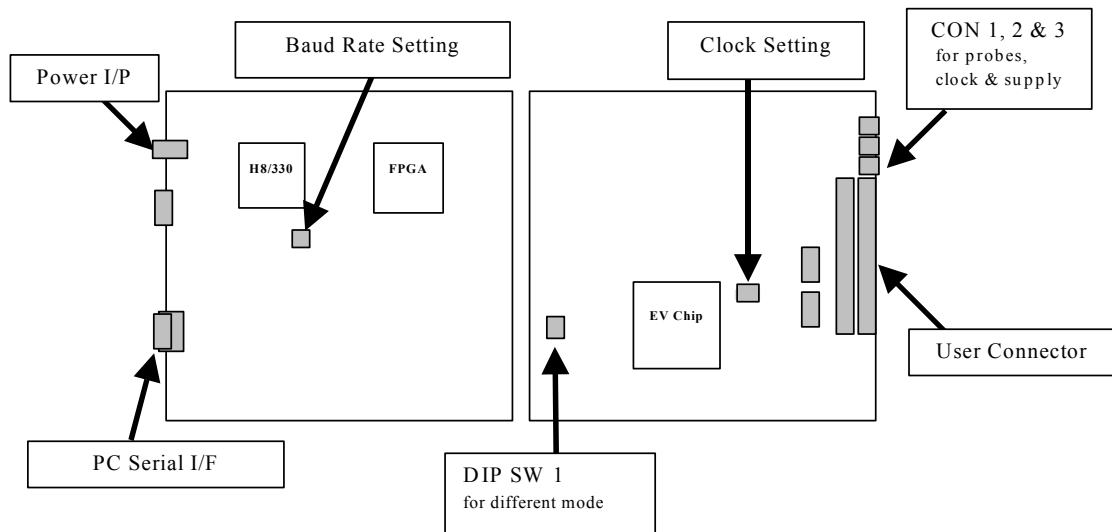


Figure 2-1 Layout of Switches & Connector Clock Settings For ALE300L-H8/3880R Emulator

2.1.1 Clock Setting For ALE300L-H8/3880R Emulator

Table 2-1 Jumper Settings for clock selections

Sub Clock Selection	INT	TGT	
External clock	Off	On	
Main Clock Selection	INT	EXT	TGT
Emulator Internal clock (10MHz)*	On	Off	Off

Note: Change the internal Main Clock to a 10 MHz Oscillator.

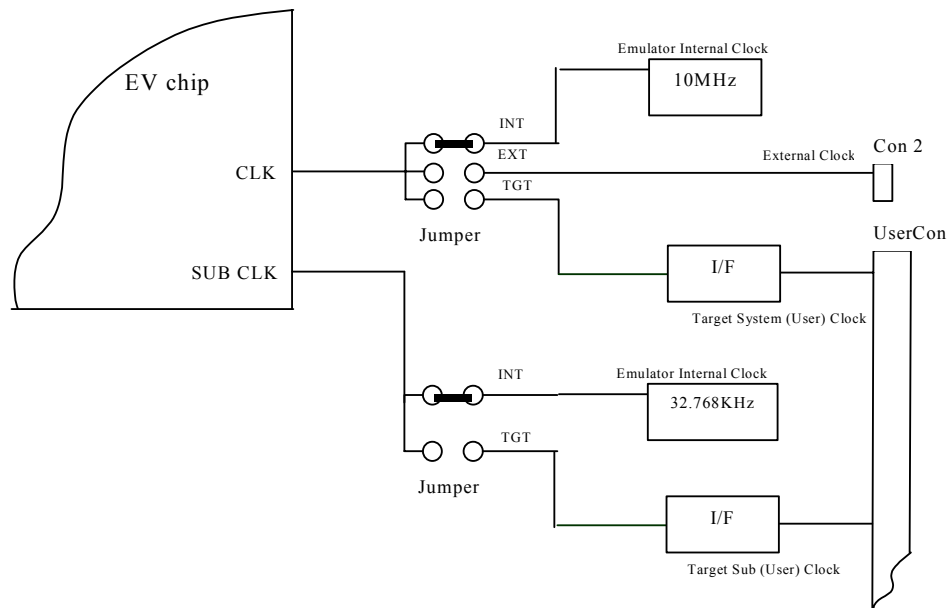


Figure 2-2 Clock input setting

2.1.2 User Power Supply

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

Note : 5V is output from emulator, &

UserVCC is the supply input 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 i.e. Drawing power from User target system. The voltage range of UserVCC will depend on the actual MCU's specification. Generally, ALE300L can support 1.8 - 5 Volts.

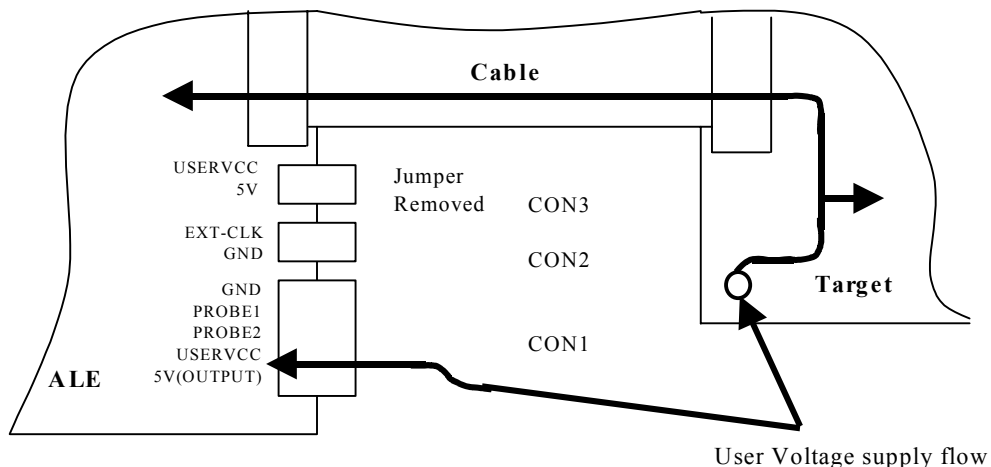


Figure 2-3 With Target connected running at UserVcc

Note: Ensure that the jumper is removed if a target voltage (1.8~ 5 Volts) is input into UserVcc pin. If otherwise, UserVcc will be shorted to VCC (5 Volts), which may cause damages to the emulator.

2.1.3 Interface Between ALE300L-H8/3880R Emulator and ALE300L-H8/3937(R) Flex Decoder Board

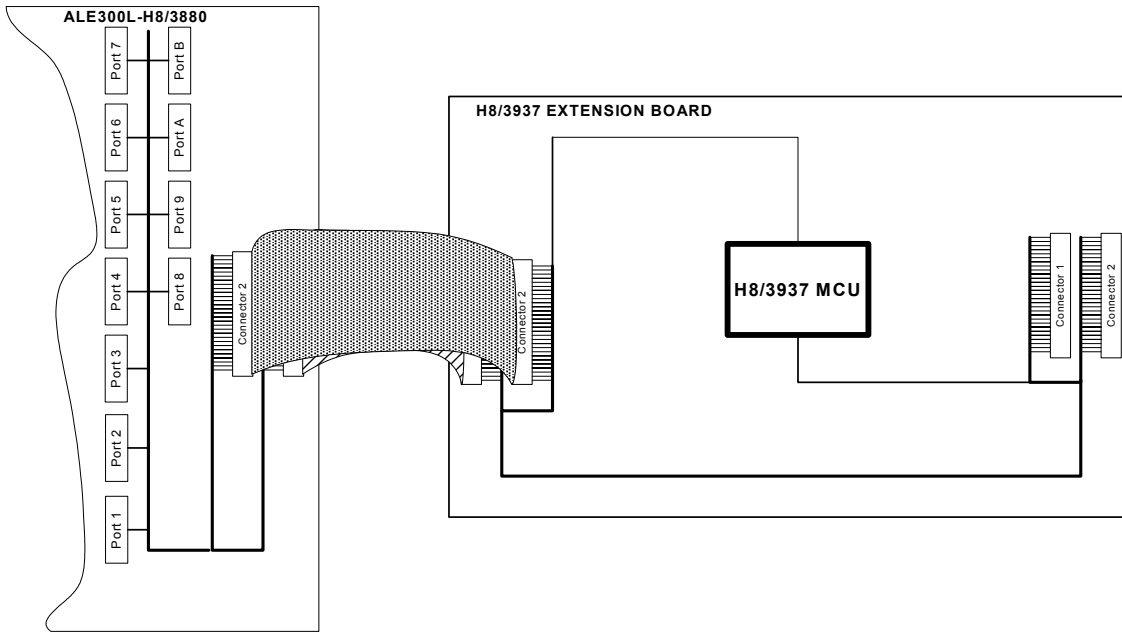


Figure 2-4 Interface between ALE300L-H8/3880R Emulator and ALE300L-H8/3937(R) Flex Decoder Board

The ALE300L-H8/3880R Emulator is interfaced with the ALE300L-H8/3937(R) Flex Decoder Board by means of 2 60-ways Ribbon Cable. The Emulator Connector 1 and 2 is connected the Option Board Connector 1 and 2 respectively (as shown in Figure 2-4). Table 2-2 describes the Output Connector Pin assignment of the ALE300L-H8/3880R Emulator and the Input Connector Pin assignment of the ALE300L-H8/3937(R) Flex Decoder Board.

Table 2-2 Pin Assignment of USERCON1 & 2 and IEBCON1 & 2

ALE300L-H8/3880R ALE-60P (USERCON 1)		ALE300L-H8/3937(R) Flex Decoder Board EB-60P (IEBCON 1)		ALE300L-H8/3880R ALE-60P (USERCON 2)		ALE300L-H8/3937(R) Flex Decoder Board EB-60P (IEBCON 2)	
Pin No	Description	Pin No	Description	Pin No	Description	Pin No	Description
1	GND	1	GND	1	V1	1	-
2	OSC1	2	OSC1	2	V2	2	-
3	-	3	-	3	V3	3	-
4	GND	4	GND	4	GND	4	GND
5	EMVCC	5	EMVCC	5	UVCCOUT	5	UVCCOUT
6	-	6	-	6	P51/~WKP1/SEG2	6	P51/~WKP1
7	AVSS	7	AVSS	7	P50/~WKP0/SEG1	7	P50/~WKP0
8	PB7/AN7	8	PB7/AN7	8	PA0/COM1	8	PA0
9	UVCCOUT	9	UVCCOUT	9	PA1/COM2	9	PA1
10	P97/SEG40	10	-	10	PA2/COM3	10	PA2
11	AVCC	11	AVCC	11	PA3/COM4	11	PA3
12	GND	12	GND	12	V0	12	-
13	P96/SEG39	13	-	13	GND	13	GND
14	P95/SEG38	14	-	14	P61/SEG10	14	P61
15	P42/TXD32	15	P42/TXD32	15	P60/SEG9	15	P60
16	P43/~IRQ0	16	P43/~IRQ0	16	P57/~WKP7/SEG8	16	P57/~WKP7
17	GND	17	GND	17	P56/~WKP6/SEG7	17	P56/~WKP6
18	P94/SEG37	18	-	18	P55/~WKP5/SEG6	18	P55/~WKP5
19	PB0/AN0	19	PB0/AN0	19	P54/~WKP4/SEG5	19	P54/~WKP4
20	PB1/AN1	20	PB1/AN1	20	P53/~WKP3/SEG4	20	P53/~WKP3
21	P93/SEG36	21	P93	21	P52/~WKP2/SEG3	21	P52/~WKP2
22	AVSS	22	AVSS	22	GND	22	GND
23	GND	23	GND	23	P71/SEG18	23	P71
24	AVSS	24	AVSS	24	P70/SEG17	24	P70
25	PB2/AN2	25	PB2/AN2	25	P67/SEG16	25	P67
26	PB3/AN3	26	PB3/AN3	26	P66/SEG15	26	P66
27	PB4/AN4	27	PB4/AN4	27	P65/SEG14	27	P65
28	PB5/AN5	28	PB5/AN5	28	P64/SEG13	28	P64
29	PC0	29	-	29	P63/SEG12	29	P63
30	PC1	30	-	30	P62/SEG11	30	P62
31	PC2	31	-	31	GND	31	GND
32	PC3	32	-	32	P81/SEG26	32	P81
33	AVSS	33	AVSS	33	P80/SEG25	33	P80
34	PB6/AN6	34	PB6/AN6	34	P77/SEG24	34	P77
35	P16/~IRQ2	35	P16/~IRQ2	35	P76/SEG23	35	P76
36	P15/~IRQ1/TMIC	36	P15/~IRQ1/TMIC	36	P75/SEG22	36	P75
37	P14/~IRQ4/~ADTRG	37	P14/~IRQ4/~ADTRG	37	P74/SEG21	37	P74
38	P13/TMIG	38	P13/TMIG	38	P73/SEG20	38	P73
39	P12/TMOFH	39	P12/TMOFH	39	P72/SEG19	39	P72

40	P11/TMOFL	40	P11/TMOFL	40	GND	40	GND
41	P10/TMOW	41	P10/TMOW	41	P82/SEG27	41	P82
42	/RES	42	/RES	42	P83/SEG28	42	P83
43	GND	43	GND	43	P84/SEG29	43	P84
44	P17/~IRQ3/TMIF	44	P17/~IRQ3/TMIF	44	P85/SEG30	44	P85
45	P30/PWM	45	P30	45	P86/SEG31	45	P86
46	P31/UD	46	P31/UD	46	P87/SEG32	46	P87
47	P32/~RESO	47	P32/~RESO	47	P40/SCK32	47	P40/SCK32
48	P33/SCK31	48	P33/SCK31	48	P41/RXD32	48	P41/RXD32
49	P34/RXD31	49	P34/RXD31	49	GND	49	GND
50	P35/TXD31	50	P35/TXD31	50	P27	50	-
51	P36/AEVH	51	P36	51	P26	51	-
52	GND	52	GND	52	P25	52	-
53	PA7	53	-	53	P24	53	P24
54	PA6	54	-	54	P23	54	P23
55	PA5	55	-	55	P22/SO1	55	P22/SO1
56	PA4	56	-	56	P21/SI1	56	P21/SI1
57	P92/SEG35	57	P92	57	P20/SCK1	57	P20/SCK1
58	P91/SEG34	58	P91	58	P37/AEVL	58	P37
59	P90/SEG33	59	P90	59	X1	59	X1
60	GND	60	GND	60	GND	60	GND

2.2 ALE-300L-H8/3937(R) Flex Decoder Board Setup

2.2.1 Clock Settings for ALE300L-H8/3937(R) Option Board

Table 2-3 Jumper Settings for clock selections

Sub Clock Selection	EJP1	
	1-2	3-4
Option Board's 76.8 KHz	Short	Short
Option Board's 160 KHz	Short	Open
Target Sub-Clock	Open	-

2.2.2 Interface Between ALE300L-H8/3937(R) Option Board and Target System

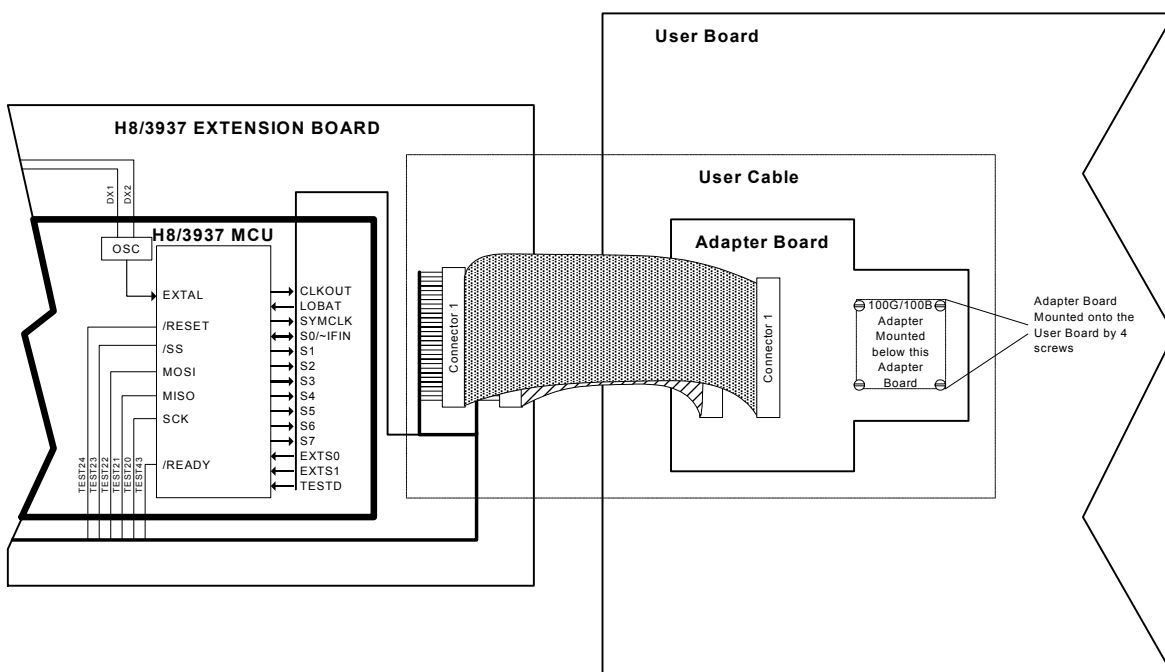


Figure 2-5 Interface circuitry between ALE300L-H8/3937(R) Flex Decoder Board and User Board

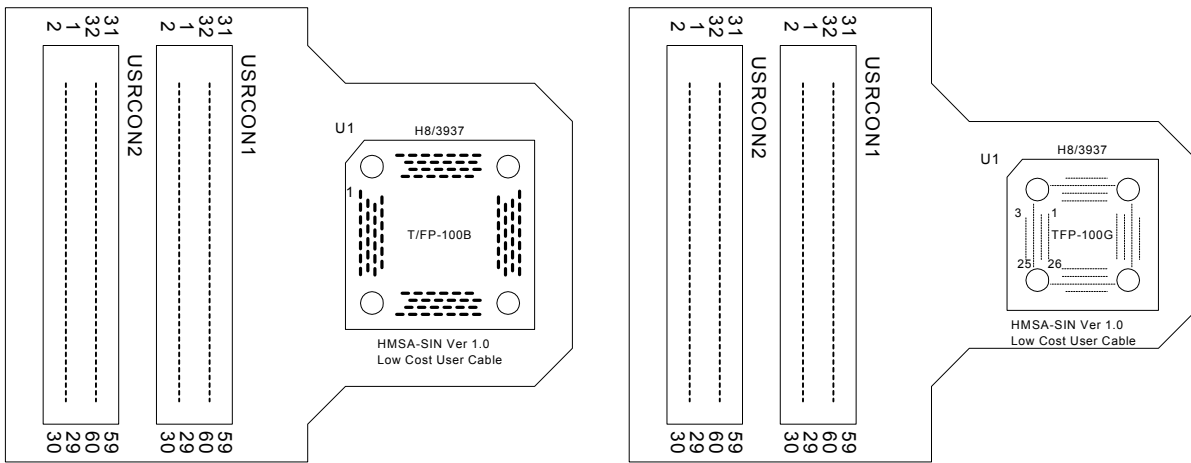
2.2.2.1. Interface Between ALE300L-H8/3937(R) Flex Decoder Board and Adapter Board

Figure 2-5 shows the ALE300L-H8/3937(R) Flex Decoder Board is connected to the User Board by a User Cable. The ALE300L-H8/3937(R) Flex Decoder Board is connected to the Adapter Board by means of 2 60-ways Ribbon Cable. The Option Board Connector 1 and 2 is connected to the Adapter Board Connector 1 and 2 respectively (as shown in Figure 2-5). Table 2-4 describes the Output Connector Pin assignment of the H8/3937 Option Board and the Input Connector Pin assignment of the Adapter Board.

Table 2-4 Pin Assignment of OEBCON1 & 2 and USERCON1 & 2

Option Board Connector, OEBCON 1 and User Cable Connector, USERCON 1				Option Board Connector, OEBCON 2 and User Cable Connector, USERCON 2			
Pin No		Pin No		Pin No		Pin No	
1	GND	31	GND	1	GND	31	S5
2	PB1/AN1	32	P30	2	UVCCOUT	32	S4
3	PB2/AN2	33	P31/UD	3	GND	33	S3
4	PB3/AN3	34	P32/~RESO	4	P70	34	S2
5	PB4/AN4	35	P33/SCK31	5	P71	35	S1
6	PB5/AN5	36	P34/RXD31	6	P72	36	S0/IFIN
7	PB6/AN6	37	P35/TXD31	7	P73	37	GND
8	PB7/AN7	38	P36	8	P74	38	CLKOUT
9	GND	39	P37	9	P75	39	GND
10	AVSS	40	GND	10	P76	40	TESTD
11	GND	41	TESTA9H	11	P77	41	GND
12	OSC1	42	GND	12	GND	42	DX1
13	GND	43	P50/~WKP0	13	P40/SCK32	43	GND
14	UVCCOUT	44	P51/~WKP1	14	P41/RXD32	44	TEST
15	GND	45	P52/~WKP2	15	P42/TXD32	45	GND
16	~RES	46	P53/~WKP3	16	GND	46	P80
17	GND	47	P54/~WKP4	17	TEST43	47	P81
18	P10/TMOW	48	P55/~WKP5	18	TEST20	48	P82
19	P11/TMOFL	49	P56/~WKP6	19	TEST21	49	P83
20	P12/TMOFH	50	P57/~WKP7	20	TEST22	50	P84
21	P13/TMIG	51	GND	21	TEST23	51	P85
22	P14/~IRQ4/~ADTRG	52	P60	22	TEST24	52	P86
23	P15/~IRQ1/TMIC	53	P61	23	LOBAT	53	P87
24	P16/~IRQ2	54	P62	24	EXTS1	54	P90
25	P17/~IRQ3/TMIF	55	P63	25	EXTS0	55	P91
26	GND	56	P64	26	GND	56	P92
27	PA0	57	P65	27	SYMCLK	57	P93
28	PA1	58	P66	28	GND	58	GND
29	PA2	59	P67	29	S7	59	AVCC
30	PA3	60	GND	30	S6	60	PB0/AN0

2.2.2.2. Adapter Board



Top View of TQFP-100B User Cable

Top View of TQFP-100G User Cable

Figure 2-6 User Cable

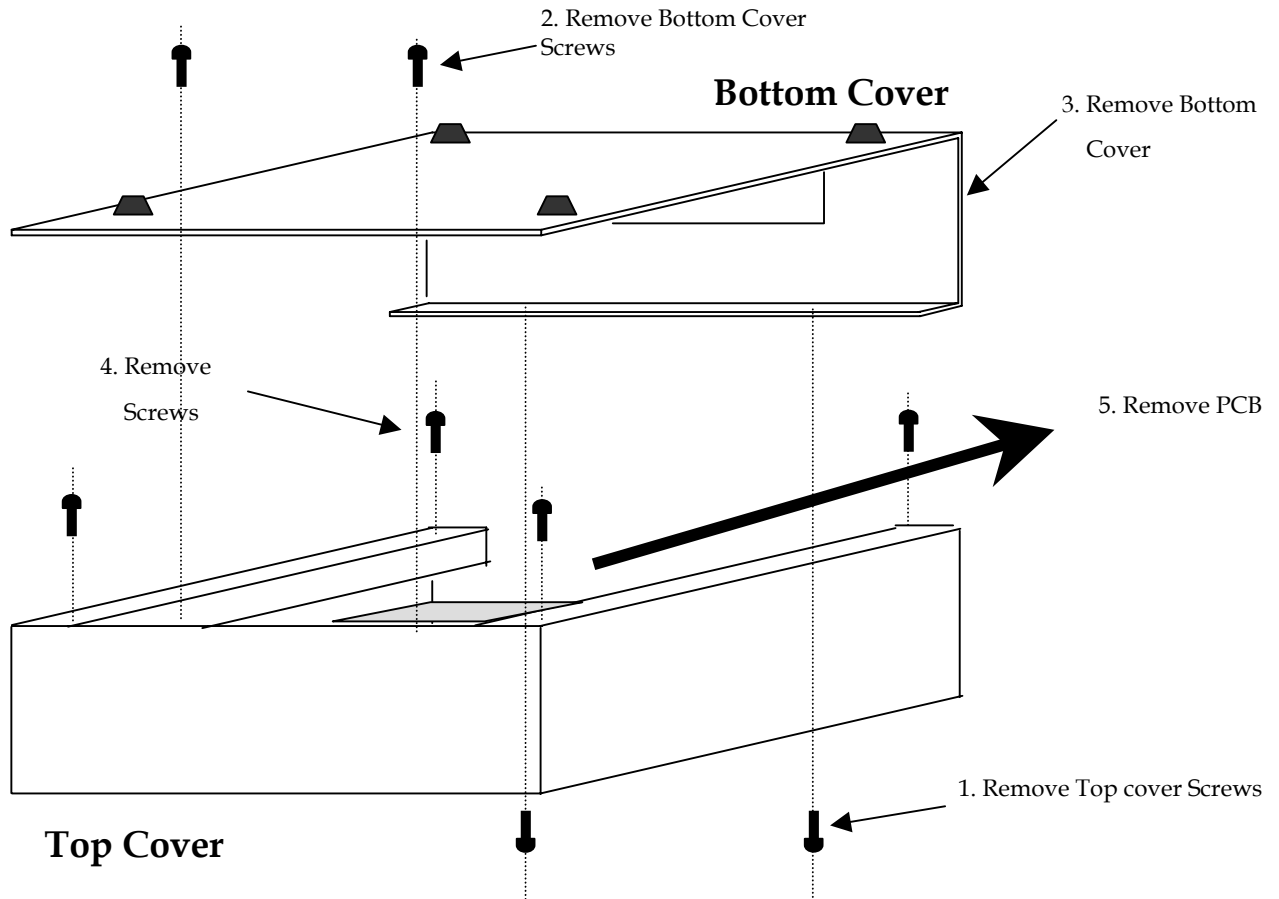
Basically, the 2 60-way Connectors on the Adapter Board are routed to the adapter and Table 2-5 shows the pin assignment of the adapter.

Table 2-5 Pin Assignment of TQFP-100B, TFP-100B & TQFP100G

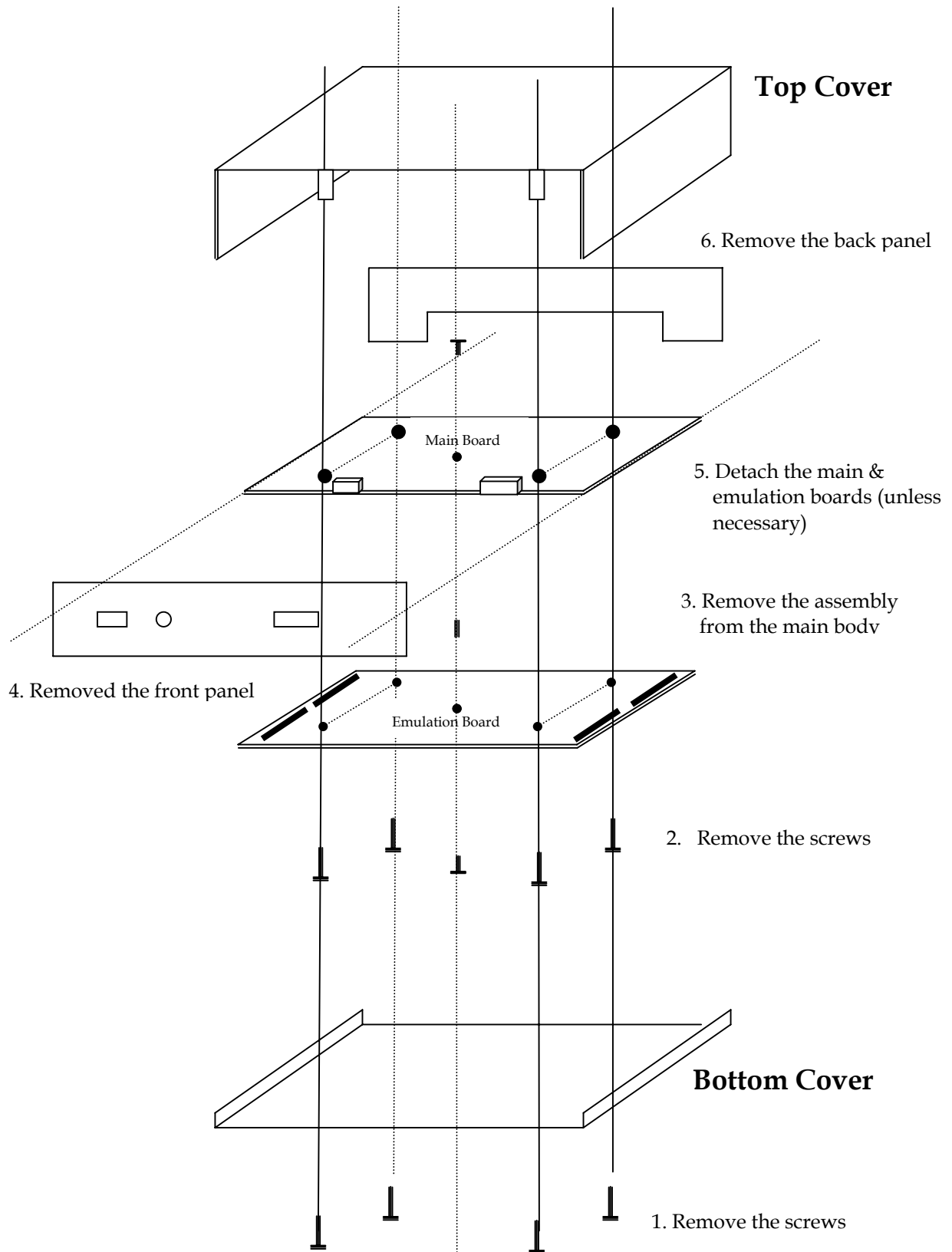
QFP-100B, TQFP-100B, TQFP100G							
Pin No		Pin No				Pin No	
1	PB1/AN1	26	P30	51	UVCCOUT	76	S5
2	PB2/AN2	27	P31/UD	52	GND	77	S4
3	PB3/AN3	28	P32/~RESO	53	P70	78	S3
4	PB4/AN4	29	P33/SCK31	54	P71	79	S2
5	PB5/AN5	30	P34/RXD31	55	P72	80	S1
6	PB6/AN6	31	P35/TXD31	56	P73	81	S0/IFIN
7	PB7/AN7	32	P36	57	P74	82	CLKOUT
8	AVSS	33	P37	58	P75	83	TESTD
9	OSC2	34	TESTA9H	59	P76	84	DX2
10	OSC1	35	P50/~WKP0	60	P77	85	DX1
11	GND	36	P51/~WKP1	61	P40/SCK32	86	TEST
12	UVCCOUT	37	P52/~WKP2	62	P41/RXD32	87	P80
13	~RES	38	P53/~WKP3	63	P42/TXD32	88	P81
14	P10/TMOW	39	P54/~WKP4	64	TEST43	89	P82
15	P11/TMOFL	40	P55/~WKP5	65	TEST20	90	P83
16	P12/TMOFH	41	P56/~WKP6	66	TEST21	91	P84
17	P13/TMIG	42	P57/~WKP7	67	TEST22	92	P85
18	P14/~IRQ4/~ADTRG	43	P60	68	TEST23	93	P86
19	P15/~IRQ1/TMIC	44	P61	69	TEST24	94	P87
20	P16/~IRQ2	45	P62	70	LOBAT	95	P90
21	P17/~IRQ3/TMIF	46	P63	71	EXTS1	96	P91
22	PA0	47	P64	72	EXTS0	97	P92
23	PA1	48	P65	73	SYMCLK	98	P93
24	PA2	49	P66	74	S7	99	AVCC
25	PA3	50	P67	75	S6	100	PB0/AN0

APPENDIX A: ALE300L Assembly

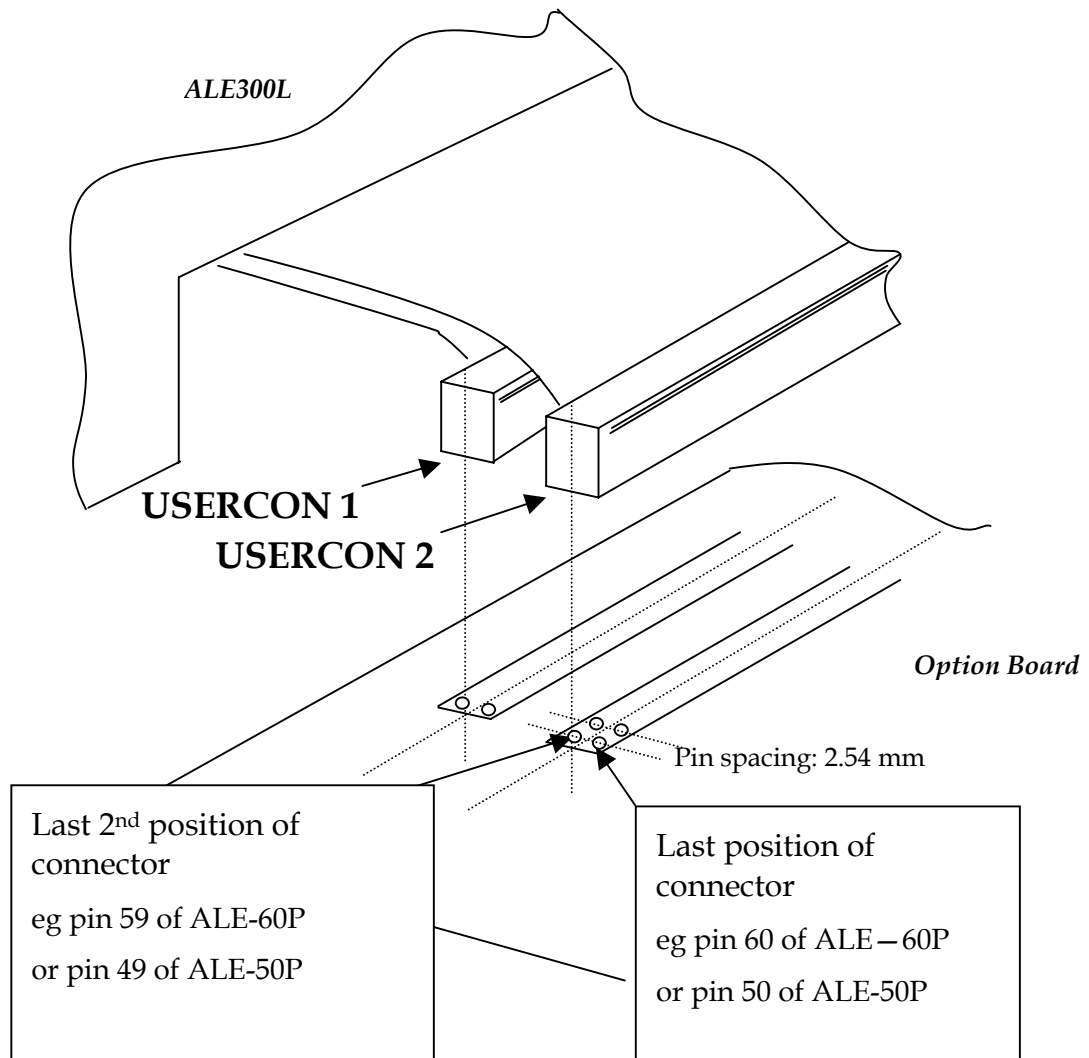
Assembly for Type 2



Assembly for Type 1



APPENDIX B: ALE300L Emulator Connector Layout



Renesas Technology (Asia Sales Offices)

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

H8/300L Series Option Board



Renesas System Solutions Asia Pte. Ltd.