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Renesas Electronics Corporation

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APPBD-LCD

LCD Application Board

Microcomputer Development Environment System

User's Manual

2004.6

APPBD-LCD – LCD Application Board User's Manual

Published by : Renesas System Solutions Asia Pte. Ltd.

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PREFACE

About this manual

This manual explains how to setup and use the LCD Application board [APPBD-LCD] for evaluating the performance of the on-chip peripheral in the microcomputer. In the subsequent write up in this manual, the application board shall term as 'APPBD'.

Operation using the ALE300L - 3800 emulator and 38024F CPU Board also detailed in the manual.

1. Introduction

Gives an introduction about the APPBD layout, key features and specification.

2. Hardware Design

Explains the detail of hardware circuit design (block by block) in APPBD.

3. Installations

Explains how to install the hardware and configuration with different type of emulator.

4. Usage Concerns

Explains the various causes of probable malfunctions that may occur during operation and suggests countermeasures to overcome them.

5. Operating Procedures

Explains the system setup and operation flow for the APPBD.

6. Software Design

Explains the detail of software design (module by module) in APPBD.

Appendices

Appendix A - APPBD-LCD Board Layout

Appendix B - APPBD-LCD Pin Assignment table;

Appendix C - APPBD-LCD Schematic Drawings;

Appendix D - APPBD-LCD – Bill of Materials

Technical Support

The APPBD is a product for evaluation purposes only. We do NOT supply the same level of support as for the development tools, however, you may contact the sales offices for downloads and documents.

Related Manuals:

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

H8/38024 Series, H8/38024F-ZTAT™ Series Hardware Manual

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1. Introduction

1.1. Overview

The LCD APPLICATION BOARD is a low-cost board designed to demonstrate the capabilities of the peripheral modules from the 8-bit microcomputer - H8/300L Super Low Power series (PROM or Flash Memory version).

This board is also accompanied with demonstration software and this software is written in ANSI 'C' language.

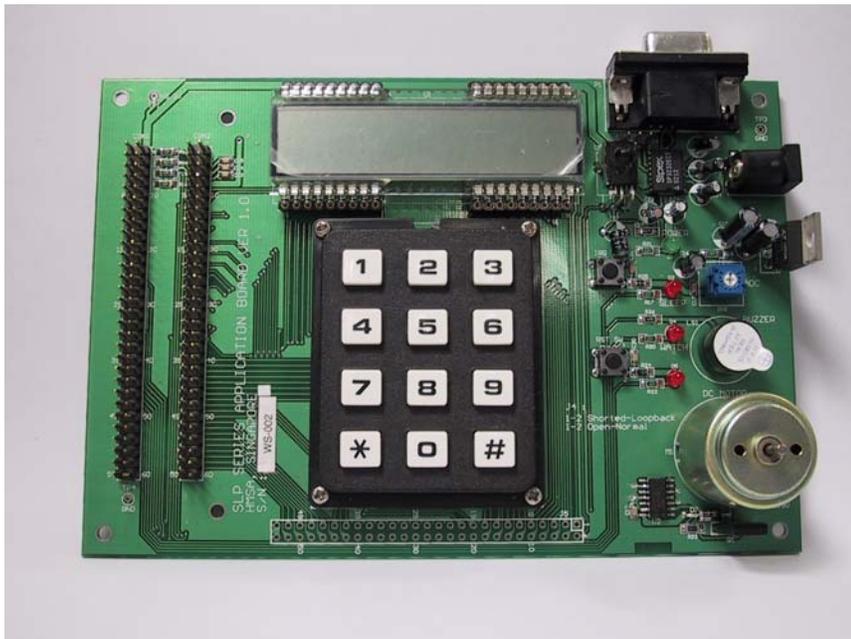


Figure 1.1 LCD Application Board [APPBD-LCD]

1.2. Specifications

The table below lists the specifications of APPBD:

Item	Specifications
Host Machine	<ul style="list-style-type: none"> <input type="checkbox"/> Minimum Pentium™ or Equivalent processor PC <input type="checkbox"/> Microsoft Windows 95 or later <input type="checkbox"/> One Serial Port
Interface Software	<ul style="list-style-type: none"> <input type="checkbox"/> Windows based HDI for ALE300L-3800 series <u>OR</u> <input type="checkbox"/> HEW2 for 38024F CPU Board
Supported MCUs	<ul style="list-style-type: none"> <input type="checkbox"/> H8/3802 Series <input type="checkbox"/> H8/38024 series <input type="checkbox"/> H8/38024F
Clock Source Selection	<ul style="list-style-type: none"> <input type="checkbox"/> Clock input from ALE-300L <input type="checkbox"/> Clock input from 38024F CPU Board
Operating Modes	Active Mode
Power Supply	<ul style="list-style-type: none"> <input type="checkbox"/> External Power Supply Voltage: +5.0 VDC <input type="checkbox"/> Current: 150mA (max)
Environmental	<ul style="list-style-type: none"> <input type="checkbox"/> Temperature: 10°C to 50 °C <input type="checkbox"/> Humidity: 30% to 85% relative humidity (no condensation) <input type="checkbox"/> No corrosive gas

1.3. Key Features

- LCD Display (32 Segments X 4 COM) [This is applicable to H8/38024 only]
- 4x3 Matrix Keypad Input
- Interrupts (IRQ0)
- Timer
- Analog to Digital Converter (ADC)
- Synchronous Serial Communication Interface (SCI 3)
- Low voltage DC Motor (PWM demonstration)
- Buzzer
- Power-down Modes
- Interface to 38024F CPU board
- Interface to ALE300L – H8/3800 Low-cost emulator for debugging on wide range of H8/300L SLP series microcomputers
- CD-ROM based documentation (User Manual and Demo program)

1.4. Package

The APPBD is supplied in a package containing the following components:



Figure 1.2 LCD Application Board [APPBD - LCD] Package

1.4.1. Hardware Components

The hardware components included in the package are listed below.

- 1 x LCD Application Board
- 1 x RS-232 Serial cable
- 1 x DC Power Input Jack free-end cable

1.4.2. Software Components

1 x CD ROM containing User's Manual, Tutorial program Source code, Schematic drawings

Before proceeding, user has to check that all the items listed in the packing list. Please contact the relevant Asia sales office of Renesas Technology if any item is missing.

2. Hardware Design

The following drawing shows the overall design of the APPBD.

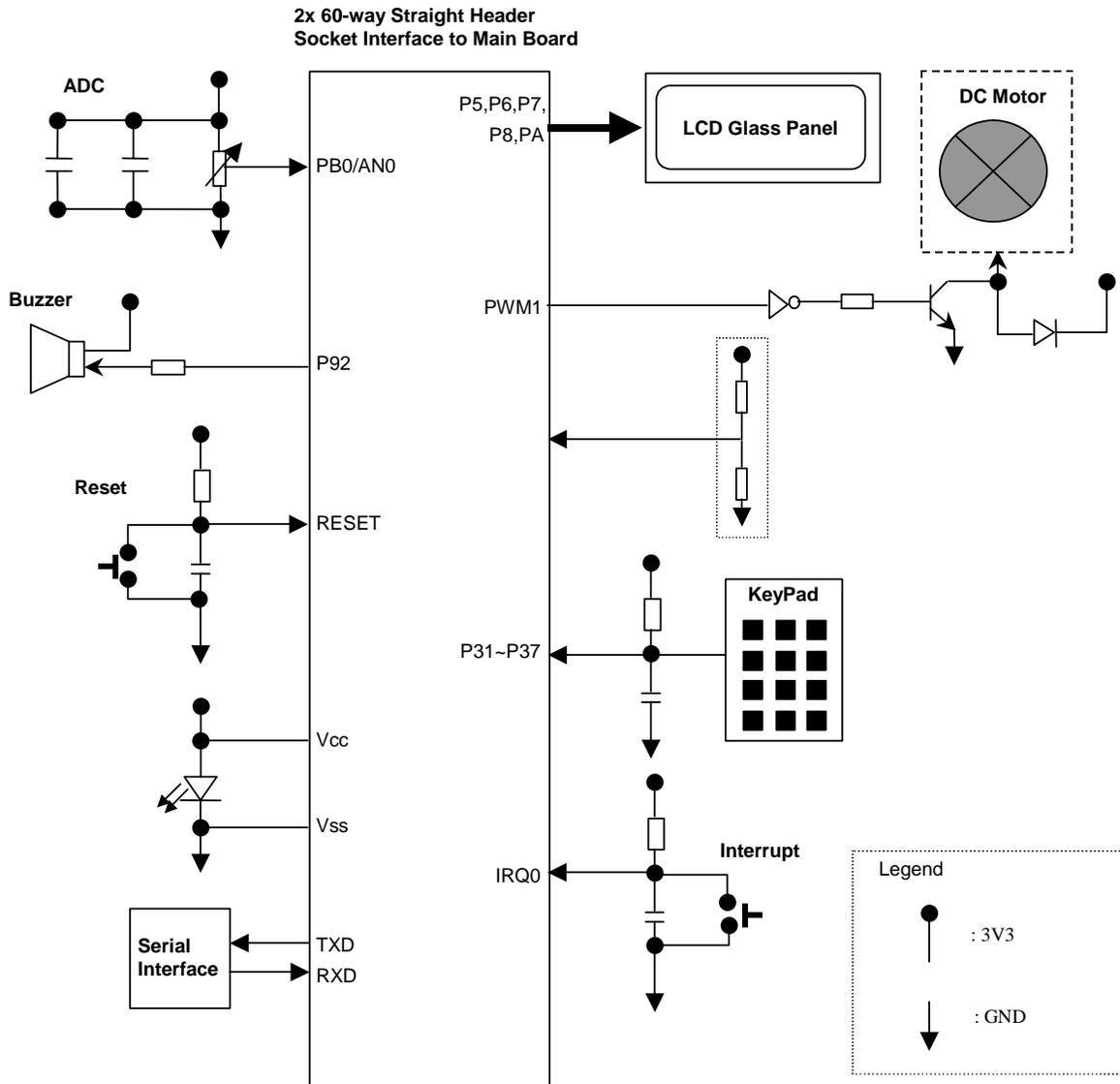


Figure 2.1 System Block Diagram

2.1. Circuit Design

The APPBD has the following circuits:

- ❑ Reset Circuit
- ❑ Interrupt Circuit
- ❑ ADC Input Circuit
- ❑ PWM Circuit
- ❑ 32-Segment x 4 COM LCD Display Circuit
- ❑ Asynchronous Serial Communication Circuit
- ❑ Infrared Remote Control Sensor Circuit
- ❑ Power Supply Circuit

2.1.1. Reset Circuit

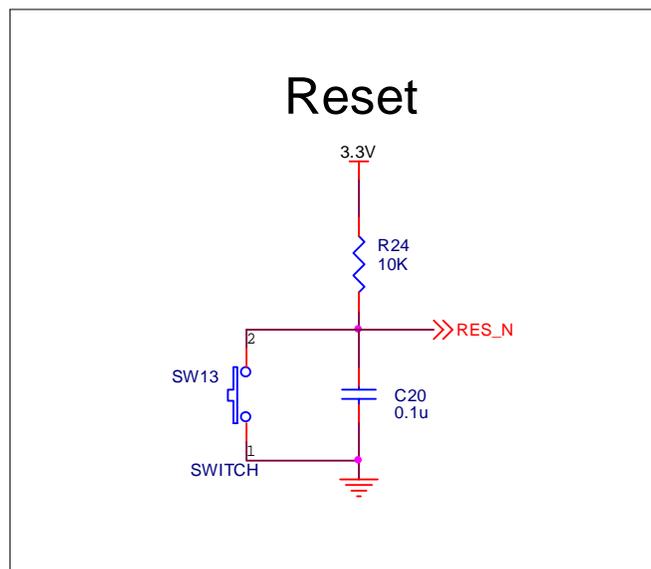


Figure 2.2 Reset Circuit

SLP device series requires an active-low signal for reset operation. Initially, the reset line is held high, when RESET (SW13) switch is pressed, the capacitor (C20) discharges through RESET switch and thus, asserting the reset line low. When the reset switch is released again, C20 charges up to +3.3V through resistor (R24).

2.1.2. Interrupt Circuit

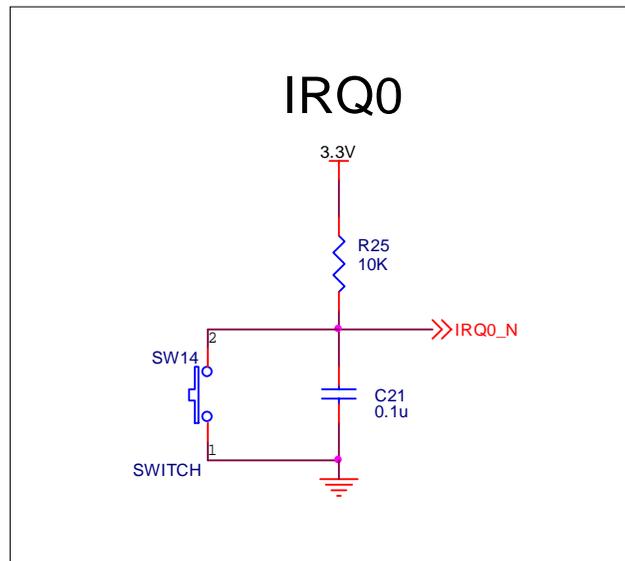


Figure 2.3 Interrupt Circuit

SLP device series requires an active low signal for IRQ0. Initially, the IRQ0 line is held high and when IRQ (SW14) switch is pressed, the capacitor (C21) discharges through IRQ0 switch asserting the IRQ0 line low. When the IRQ0 switch is released, C21 charges up to +3.3V through resistor (R25).

The APPBD demonstrates the use of IRQ0 as wake up element during the MCU power down mode.

2.1.3. ADC Circuit

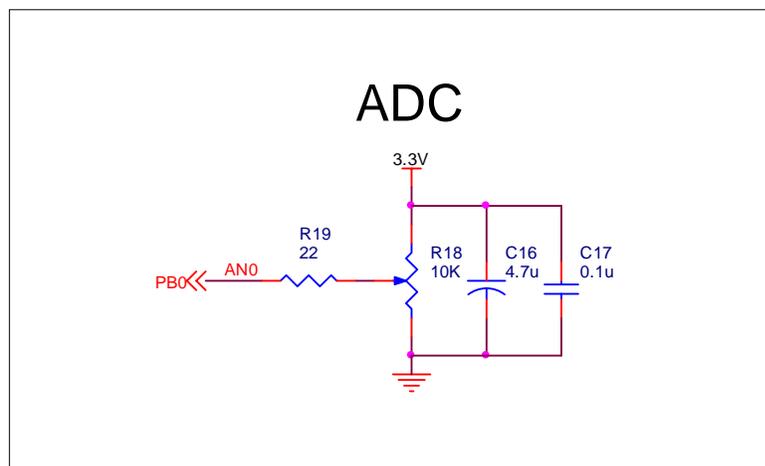


Figure 2.4 ADC Interface Circuit (AN0)

SLP device series has eight analog input channels. Only AN0 is used for the demonstration purpose. Capacitors C16 & C17 are provided to prevent low & high frequency noise. Resistor R19 is used to provide the damping effect, whereas variable potentiometer R18 is provided for the user to vary the

analogue input. The value of the input voltage is displayed on the LCD panel.
 Start the ADC conversation by pressing the keypad button '1' indicated in the main menu.

2.1.4. PWM Circuit

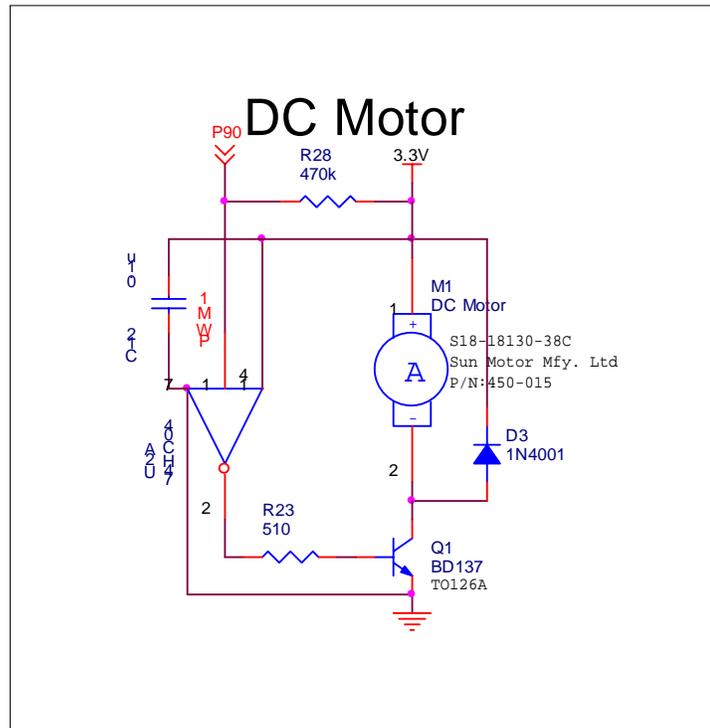


Figure 2.5 PWM Circuit

SLP device series is provided with two channels of on-chip 10-bit PWMs (Pulse Width Modulators), designated PWM1 and PWM2. Only PWM1 is used for the demonstration purpose. PWM1 is used to drive a DC motor via an INVERTER (74HC04) and NPN transistor (BD137), Diode 1N4001 is used as DC motor discharge element during power supply cut-off.

PWM1 received the converted value from the ADC, AN0 channel for controlling the spinning speed of the DC motor.

2.1.5. LCD panel Display Circuit

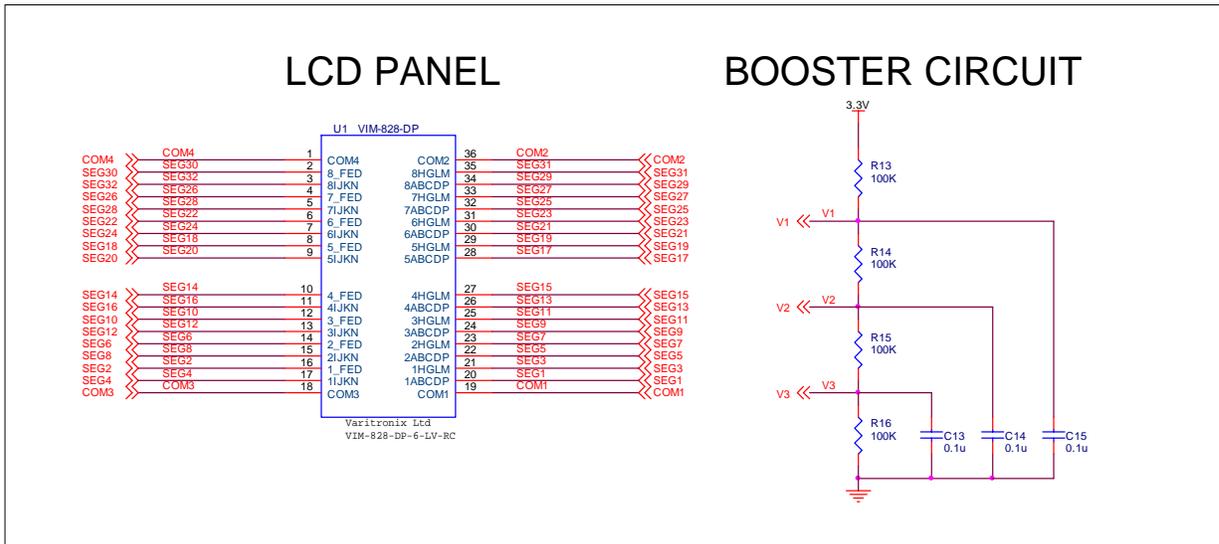


Figure 2.6 LCD panel Display Circuit

The APPBD uses 32 segments x 4 common LCD glass capable of displaying 8 characters targeted at H8/38024 series. [25 segments x 4 common for H8/3802 series] Each segment is directly connected to the output of H8/38024 device.

To turn on a particular segment, user needs to write word value to LCD RAM (H'F740 – H'F74F). When a large panel is driven, the on-chip power supply capacity may be insufficient and thus external split-resistance boosting circuit is needed. The resistor value is varied from several kΩ to several MΩ depend on the LCD glass.

2.1.6. Asynchronous Serial Communication Interface (SCI3)

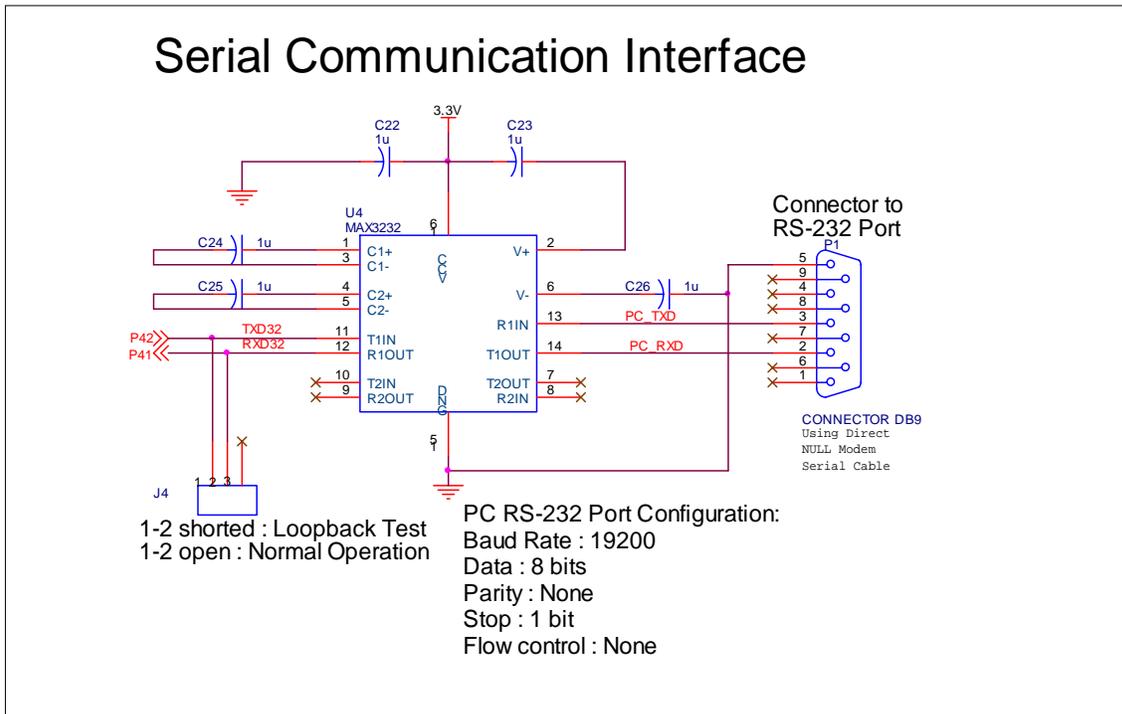


Figure 2.7 Asynchronous Serial Communication Interface

The APPBD uses SCI Channel 3 for conversion of TTL data from the microcomputer to RS-232 via RS232 transceiver (U4). Data of 8-bit character, 1 start bit, 1 stop bit and no parity bit. is sent at baud rate of 38400bps and received by looping back. The loop-back test is conducted by shorting pins 1 & 2 of J4 and the received data is then displayed on LCD panel.

The APPBD communicates with an external RS-232 interface (e.g. PC COMM1) through a DB-9 connector, and the jumper setting on J4 is ignored.

To enable the SCI port, user need to do the following step:

1. Open "ApplicationDemo.c" using HEW2
2. Edit the source code as below:

Before

```

/* Define Type of Device used */
#define CPUBD38024          0 //LCD 8 digit, IR decoding, SCI3 disable (during debugging mode)
#define ALE300L 38024  1 //LCD 8 digit, IR decoding, SCI3 enable
  
```



After

```

/* Define Type of Device used */
#define CPUBD38024          1 //LCD 8 digit, IR decoding, SCI3 disable (during debugging mode)
#define ALE300L 38024  0 //LCD 8 digit, IR decoding, SCI3 enable
  
```

3. Build (click F7) to compile the “ApplicationDemo” workspace using HEW2.
4. Download the .abs file or .mot file in standalone mode to test the SCI function.

2.1.7. Infrared Remote Control Sensor Circuit

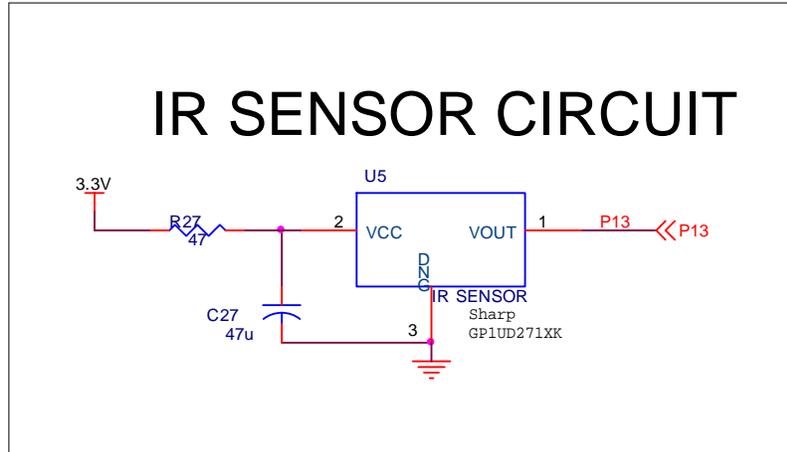


Figure 2.8 IR sensor circuit

The APPBD is equipped with one IR sensor that is able to receive the following remote signal from the following handheld remote control:

- Hitachi
- Sony
- Other 38KHz modulated infrared signal.

There is a possibility that environmental conditions such as noise from fluorescent light, Electromagnetic noise, Power supply line noise may affect the output even if no input transmission signal is present.

Remote control data format varies according to the type of handheld remote control used. As an example for IR application, no specific format is chosen for demonstration program. Therefore, a routine is required and used to remove the header and tail of the data stream captured.

In order to simplify the IR decoding and increase of data accuracy, user may need to add special header and tail removal function for the data stream captured.

Note:

Please [press] Remote control button as fast as possible (less than 1s) to allow the successful learning process.

2.1.8. Power Supply Circuit

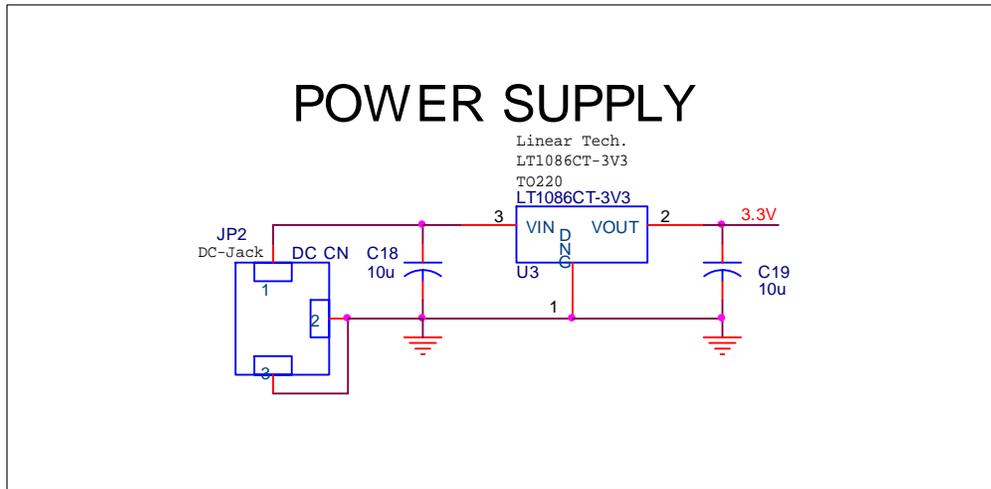


Figure 2.9 Power Supply Circuit

The APPBD works from an external DC supply (+5.0VDC ~ +9.0VDC). The input voltage is internally stepped down to +3.3VDC for the demonstration operation using a voltage regulator.

Upon power on, a LED D1 (GREEN) is lit.

When the APPBD is used with either 38024F CPU board or ALE300L emulator, external DC supply must be input to the APPBD, otherwise there might be insufficient drive from the CPU board or ALE300L emulator to drive the APPBD properly.

3. Installation

Before the installation, always ensure the power is switched OFF first. The installation is allowed in any of the following configurations:

3.1. Label of Parts on Application Board

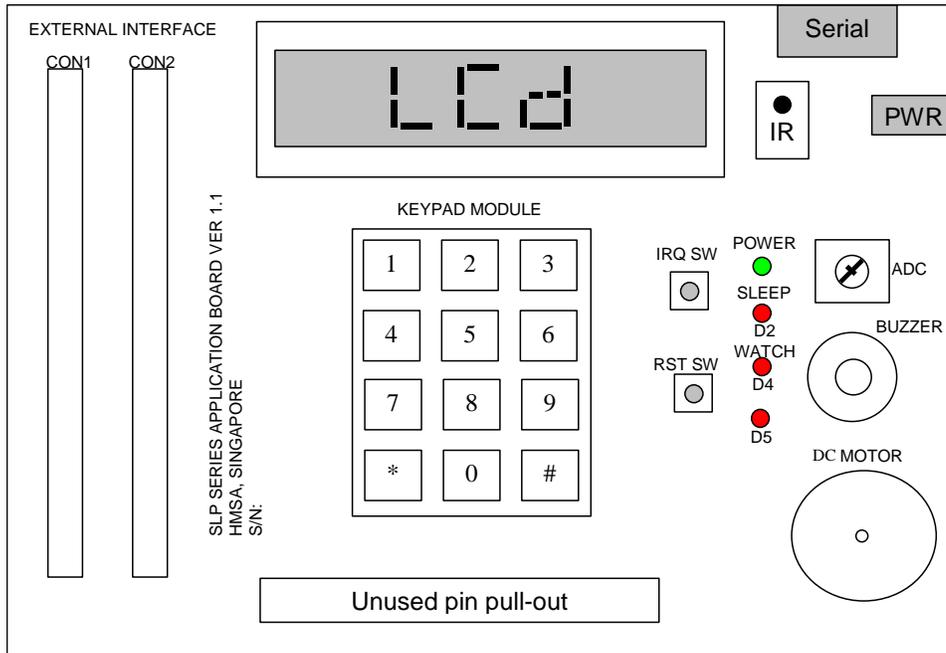


Figure 3.1 Label of Parts on Application Board

3.2. With ALE300L Emulator connected

APPBD could be connected to ALE300L emulator via two sets of 30x2pin normal-pitched (0.1") headers CON1 & CON2. A power supply of +5.0 VDC is supplied to the APPBD.

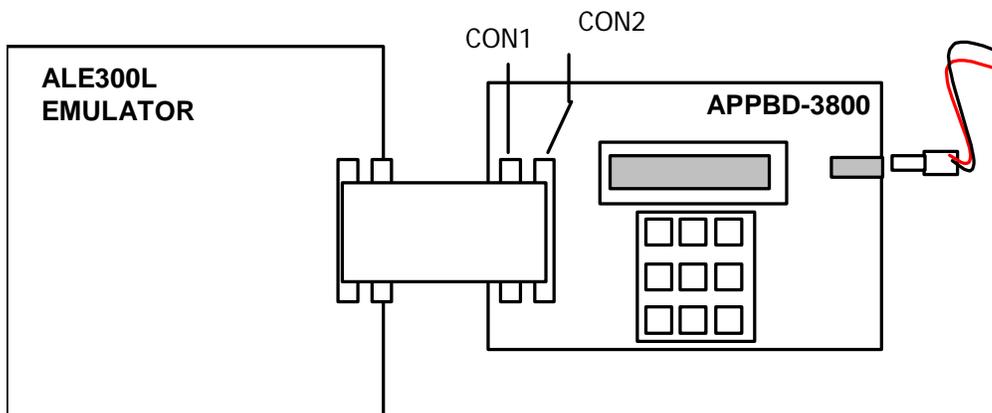


Figure 3.2 Connections to ALE300L Emulator

3.3. With 38024F CPU Board connected

APPBD could also be connected to 38024F CPU board via 30x2pin normal-pitched (0.1") headers, CON1 & CON2. A power supply of +5.0 VDC is supplied to the APPBD.

For interface with CPU board, there are jumper settings needs to be observed on the CPU board, please refer to the user manual of 38024F CPU board.

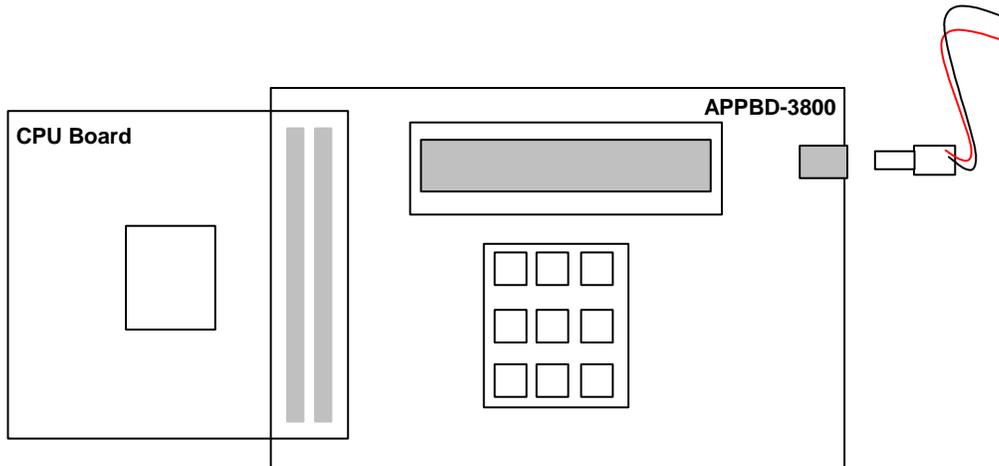


Figure 3.3 Connection to CPU board [Top View]

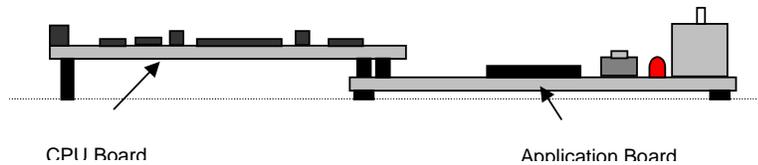


Figure 3.4 Connection to CPU Board [Cross-section view]

4. Usage Constraints

4.1. Infrared Remote function

When executing this function, users may encounter difficulty such as no recognition of the key pressed on the remote control. This is due to the remote function learning process is used to learn several brand remote control signal and algorithm used to decode all the IR protocol is difficult therefore all the IR signal come out from Remote control will be store into RAM including the Header. So please [press] Remote control button as fast as possible (less than 1s) to allow the learning process successful.

4.1.1. Causes of Malfunction

This may due to environmental conditions disturbances such as the noise from fluorescent lightings, Electromagnetic noise and Power Supply line noise. These may affect the output even if no input transmission signal is present.

4.1.2. Countermeasures

User may stick a piece of opaque black adhesive tape over the remote IC, U5 on the APPBD. This would eliminate unwanted disturbance signals.

4.2. LEDs/Buzzer/Keypad

When executing this function with a 38024F CPU board or ALE300L emulator, users may encounter the following scenarios:

- Unable to turn on LEDs
- Unable to turn on buzzer
- No response upon key pressed

4.2.1. Causes of Malfunction

For interface with 38024F CPU board, these may be caused by incorrect jumper settings on the CPU board. Please refer to section 2.5.4 in the user manual of CPU board.

For interface with 38024F CPU board or ALE300L emulator, there may be no power supply input is supplied into the APPBD.

4.2.2. Countermeasures

For interface with 38024F CPU board, please refer to section 2.5.4 in the user manual of CPU board. Ensure correct power supply input is supplied into the APPBD.

For interface with ALE300L emulator, please ensure correct power supply input is supplied into the APPBD.

5. Operating Procedures

5.1. Overview - Demonstration Program

The following describes the operations of the APPBD and the demonstration program. The demonstration program used is *AppDemo.ABS*.

When the APPBD is power on, the PWR [Green] LED, D1 turns on followed by the following display on the LCD glass:

- "0123456789* ABCDEFGHIJKLMNOPQRSTUVWXYZ"
- "1.A 2.S 3.T 4.P 5.IR" [Main Menu]

The operation of APPBD is then entirely controlled by the keypad provided with the APPBD.

Please refer to ALE300L emulator's user manual for detailed operating commands.

5.2. Switches/Keypad

The following table describes the individual functions of each keypad and switches used in the APPBD.

Keypad/switches	Descriptions
SW13	Reset
SW14	/IRQ0 (Interrupt)
R18	ADC variable resistor
Keypad 1	ADC & PWM
Keypad 2	Keypad & SCI
Keypad 3	Timer & Counter
Keypad 4	Power Down Mode
Keypad 5	Infrared Remote Receiver
Keypad *	ESC, Exit, Cancel
Keypad #	Enter / 'OK' (For IR menu)

5.3. Operation Overview

The demonstration program aims to demonstrate the salient features of the H8/300L Super Low Power series microcomputer. Users have the option to select to execute a particular test.

INPUTS:

- ❑ 12-Button Keypad (MATRIX 4x3),
- ❑ One RESET switch,
- ❑ One IRQ switch,
- ❑ One variable resistor (ADC) and
- ❑ Sharp IR Detecting Unit for Remote Control

User inputs their selections using keypad, i.e. Keypad 1 for selecting ADC & PWM test, Keypad * for returning to main menu again, adjust Variable Resistor R18 to decrease or increase ADC input voltage. Some tests, such as Infrared Remote Control Receiver demo, require data input from the IR detecting Unit (U5). In addition, IRQ switches used are interrupts to wake up the MCU during power down mode.

OUTPUTS:

- ❑ 32-Segment x 4 COM LCD
- ❑ Three LEDs
- ❑ One buzzer
- ❑ DC Motor

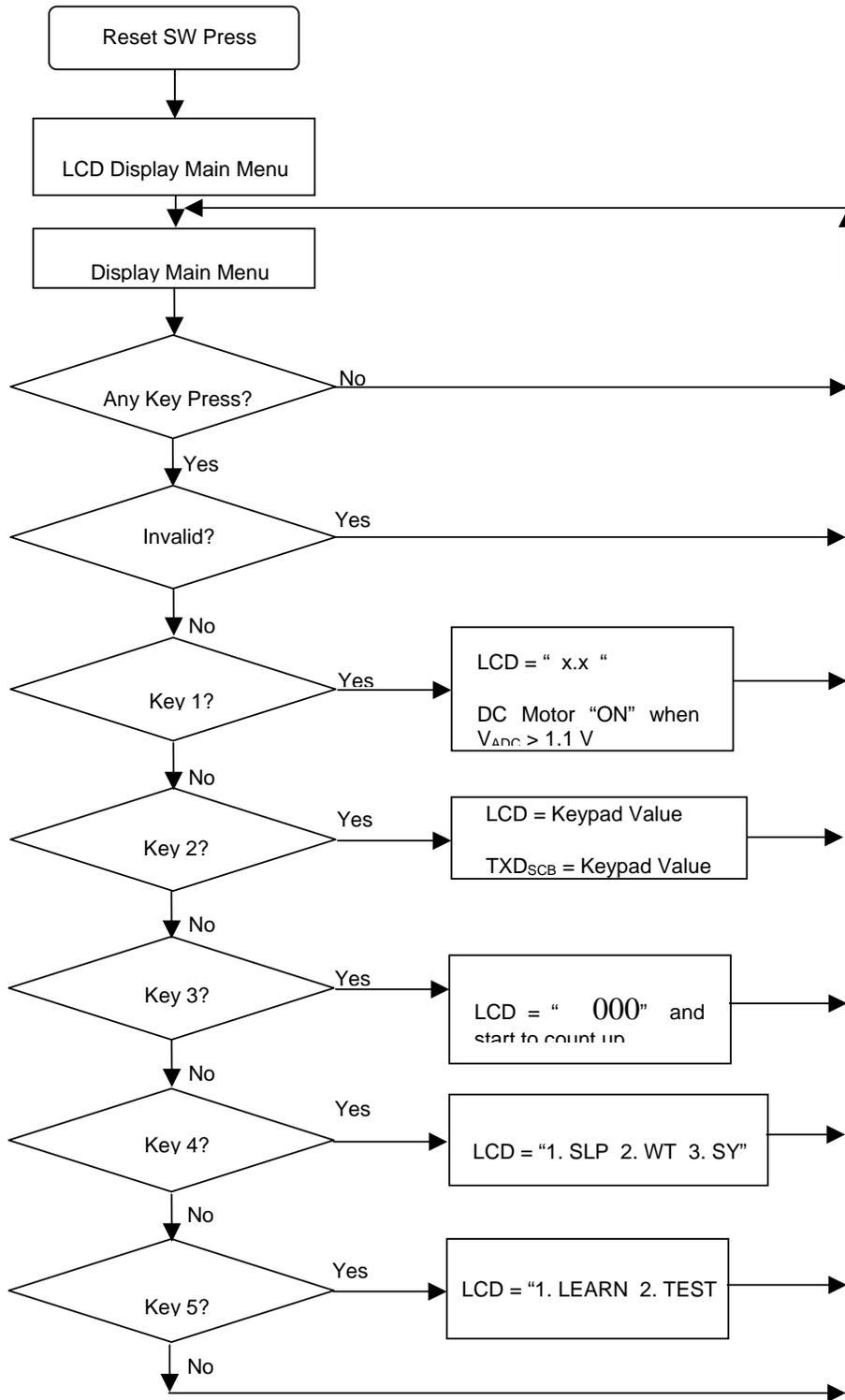
The 32-Segment x 4 COM LCD panel is used for display purposes. They display any one of the following:

- ❑ Main Menu,
- ❑ Power Down Menu, InfraRed(IR) Menu
- ❑ Result of a test etc.

The three 3mm LEDs and one buzzer LS1 provide status information for the tests (e.g. Sleep mode, watch mode, IR receiving status, progress indicator etc.)

The DC Motor is used to demonstrate 10-bit PWM feature on the Microcomputer.

5.4. Illustration of Operation Flow



5.5. Test Procedures and Descriptions

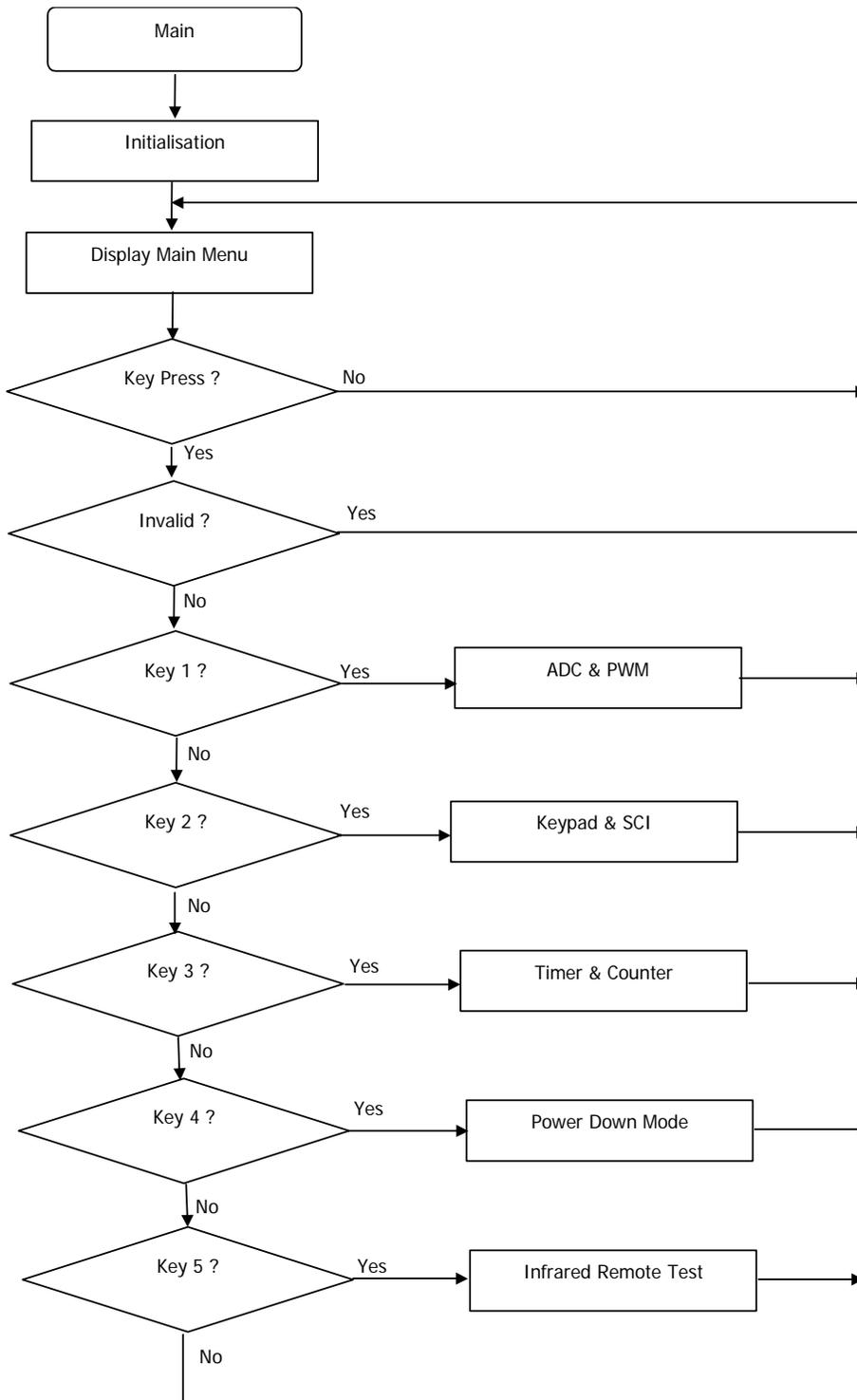
Application demonstration program is executed on the APPBD through the selection of keypad button. The demonstration program contains main menu as well as sub-menu and hence, user needs to press keypad button again to enter into the sub-menu.

No.	Demo No	Sub-demo No	Description
1	1. A (ADC & PWM)	-	ADC & PWM Test: Reading ADC (AN0) input voltage and convert to PWM value for motor driving. User can vary the analog input by adjusting the variable resistor (R18).
2	2. S (Keypad & SCI)	-	Keypad & SCI Test: LCD panel display keypad pressed, and send its ASCII value to SCI port then check for SCI receive data. Note: SCI test is only valid for ALE300L
3.	3. T (Timer & counter)	-	Timer & counter Test: LCD panel display 3 digit counter value (000-999), The counter will increment once Compare match flag Timer F turn on 10 times.
4	4. P (Power Down Mode)	1. SLEEP 2. WATCH 3. STBY	Power Down Mode Test: In the "Power down mode" demo, different power-down modes (Sleep, Watch and Standby) via SLEEP instruction with separate LED indicators can be selected. IRQ0 is then used to trigger MCU return to active mode.
5	5. IR (Infrared Remote Control Receiver)	1. LEARN 2. TEST	IR Remote Test: There are 2 sub-demos in IR Remote Test (IR LEARN and IR TEST). IR LEARN is used to read and decode remote control IR command then save to RAM area. IR TEST is used to test IR command learned just now whether can be recognize or not. (Only Hitachi & Sony VCR / TV Remote controller tested) * Please [press] Remote control button as fast as possible (less than 1s) to allow the learning process successful.

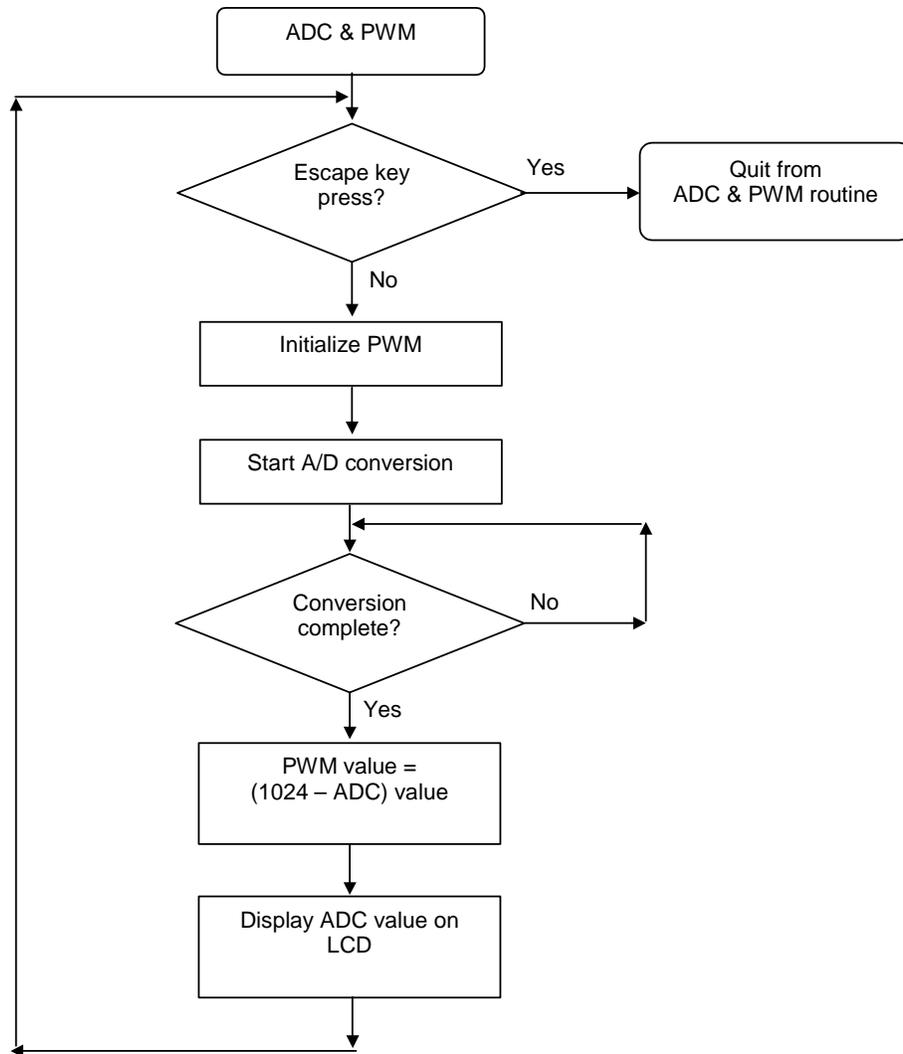
6. Software Design

Software design covers the description of the all demonstrated functions of the demonstration program.

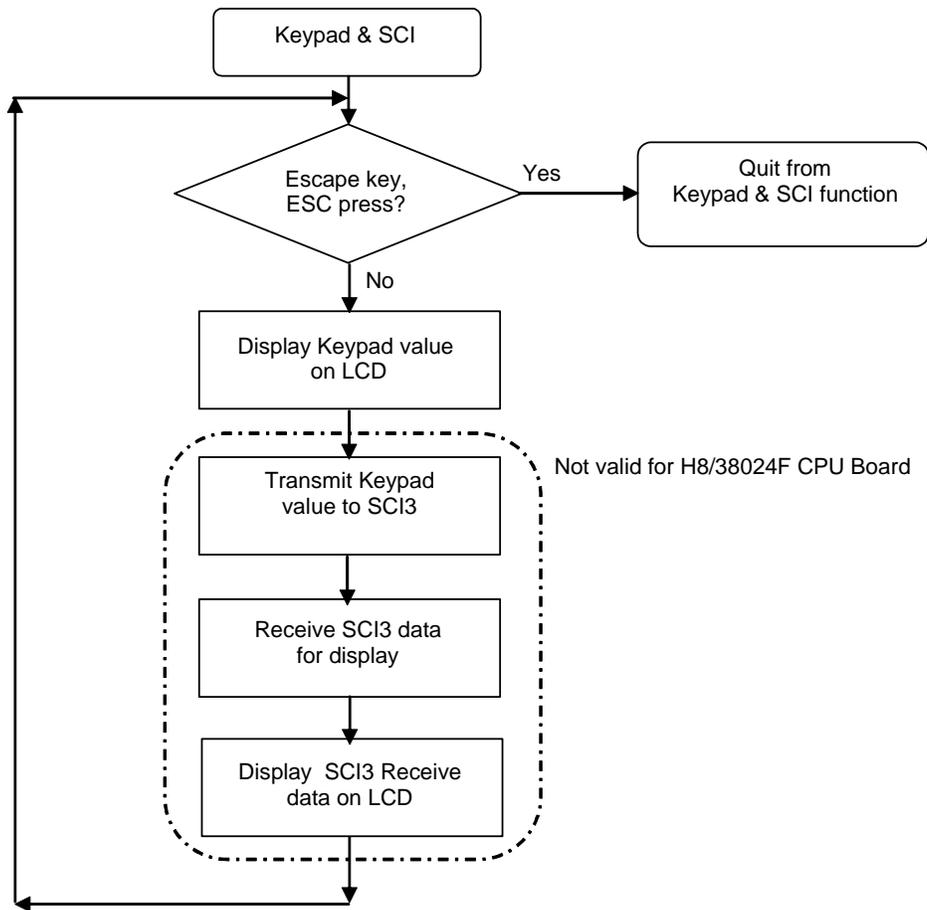
6.1. Main Program



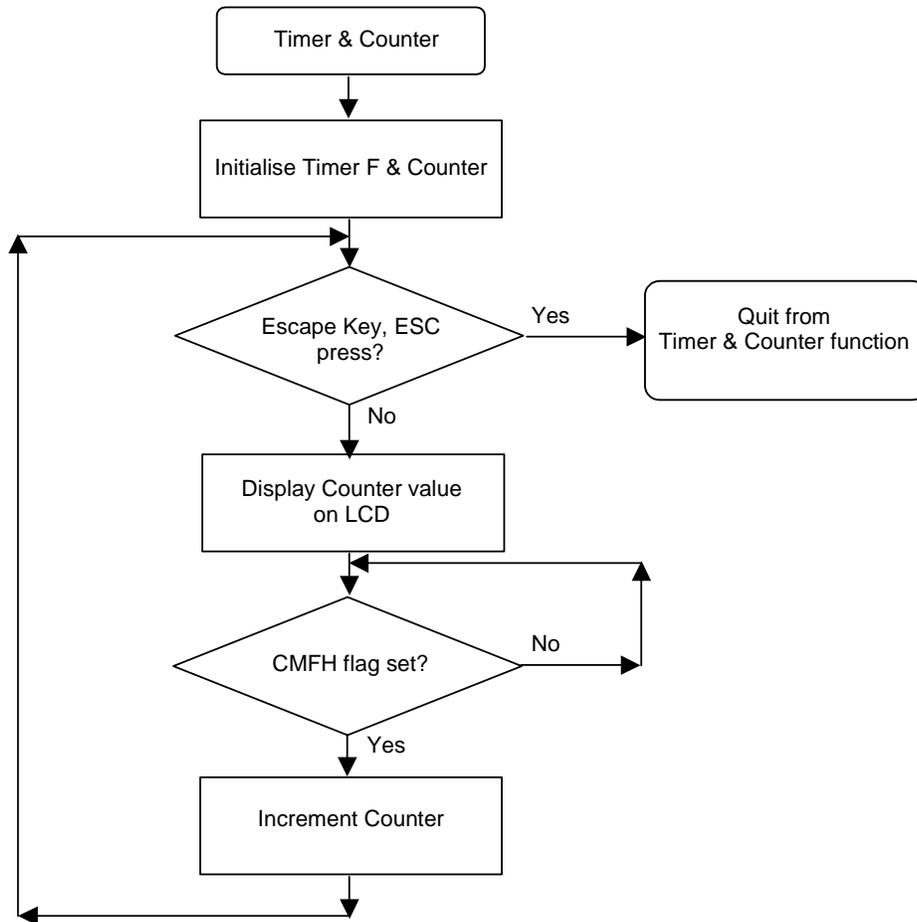
6.2. ADC & PWM function



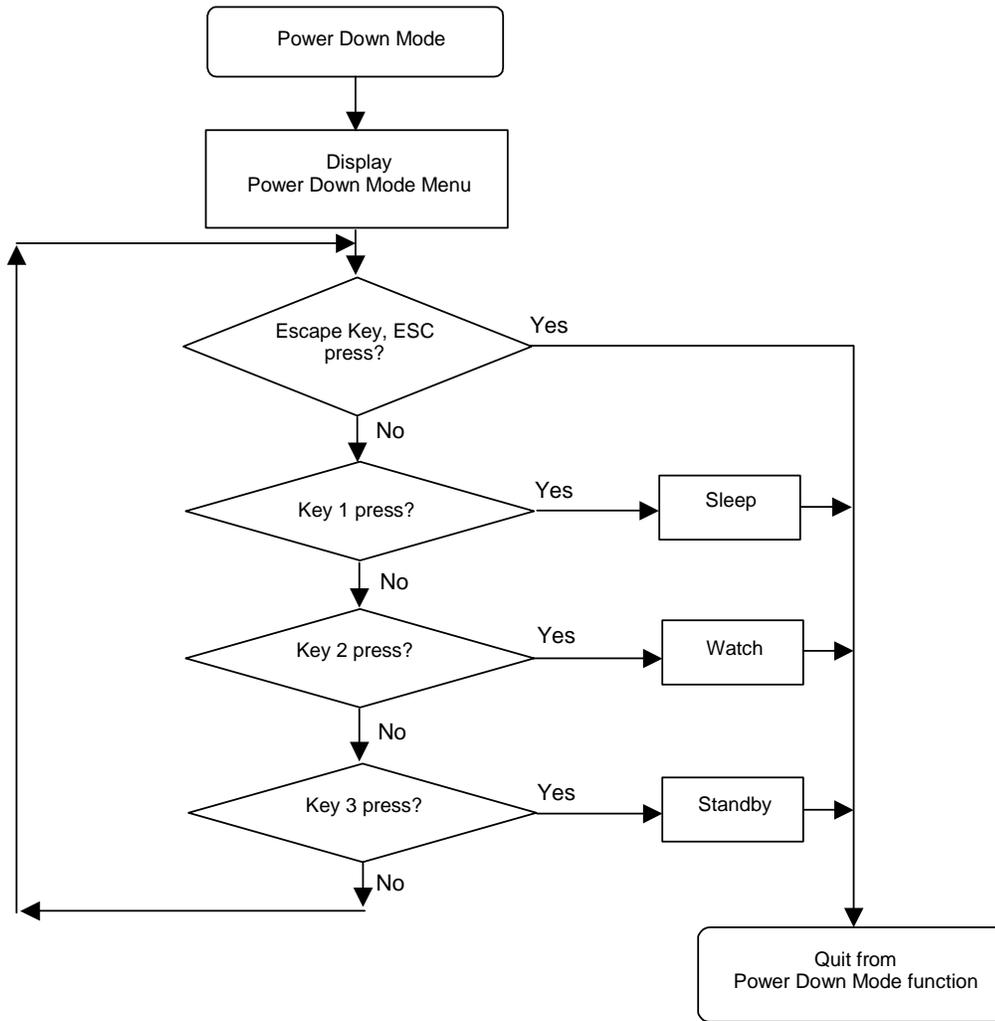
6.3. Keypad & SCI function



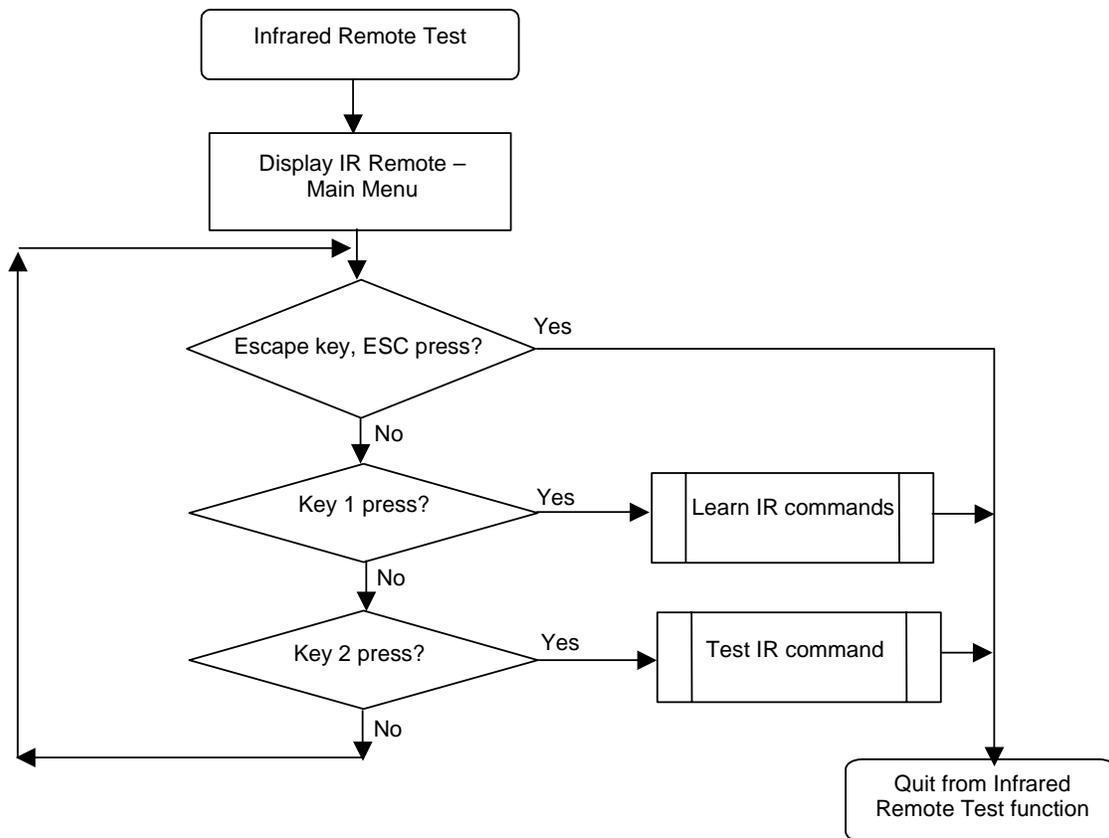
6.4. Timer & Counter function



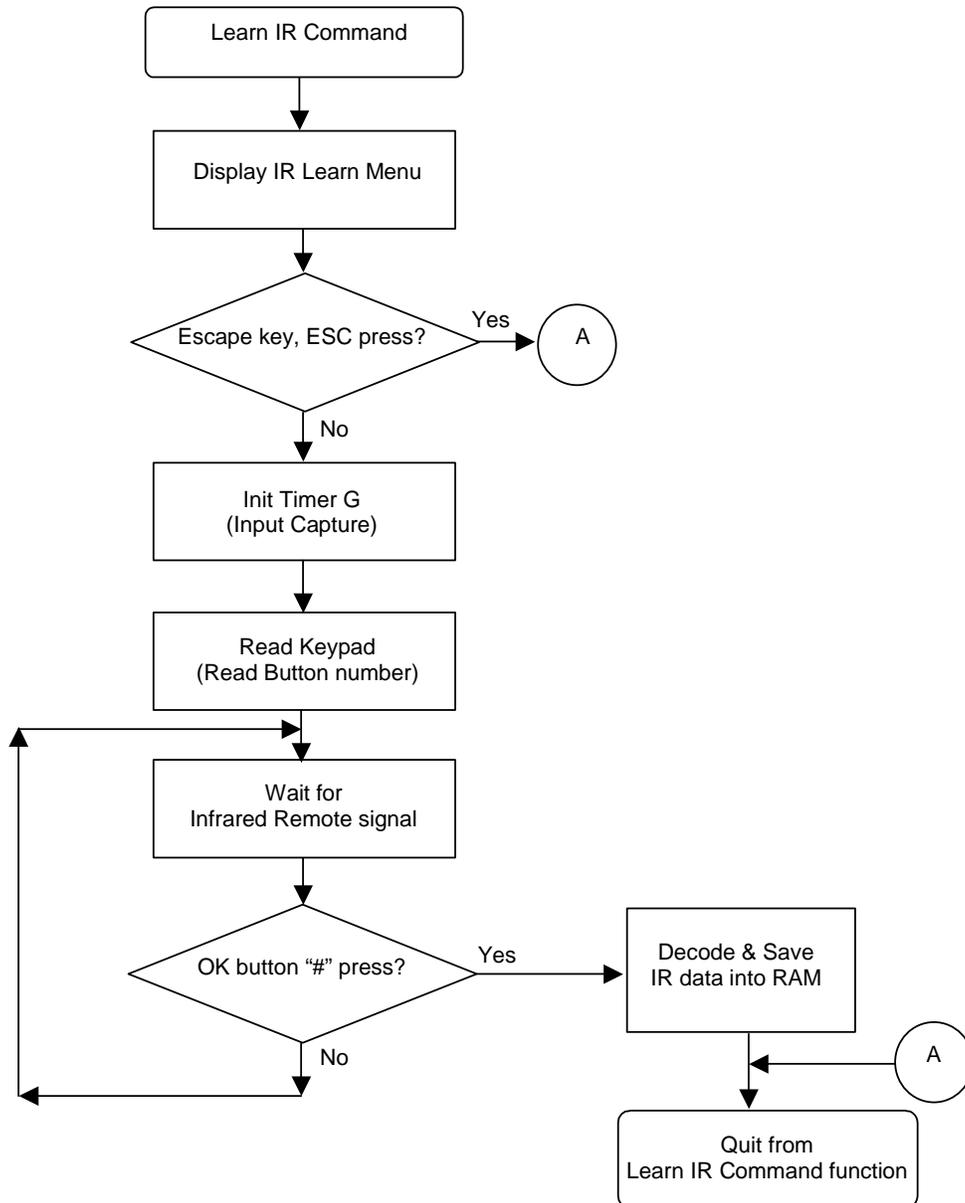
6.5. Power-Down Mode function



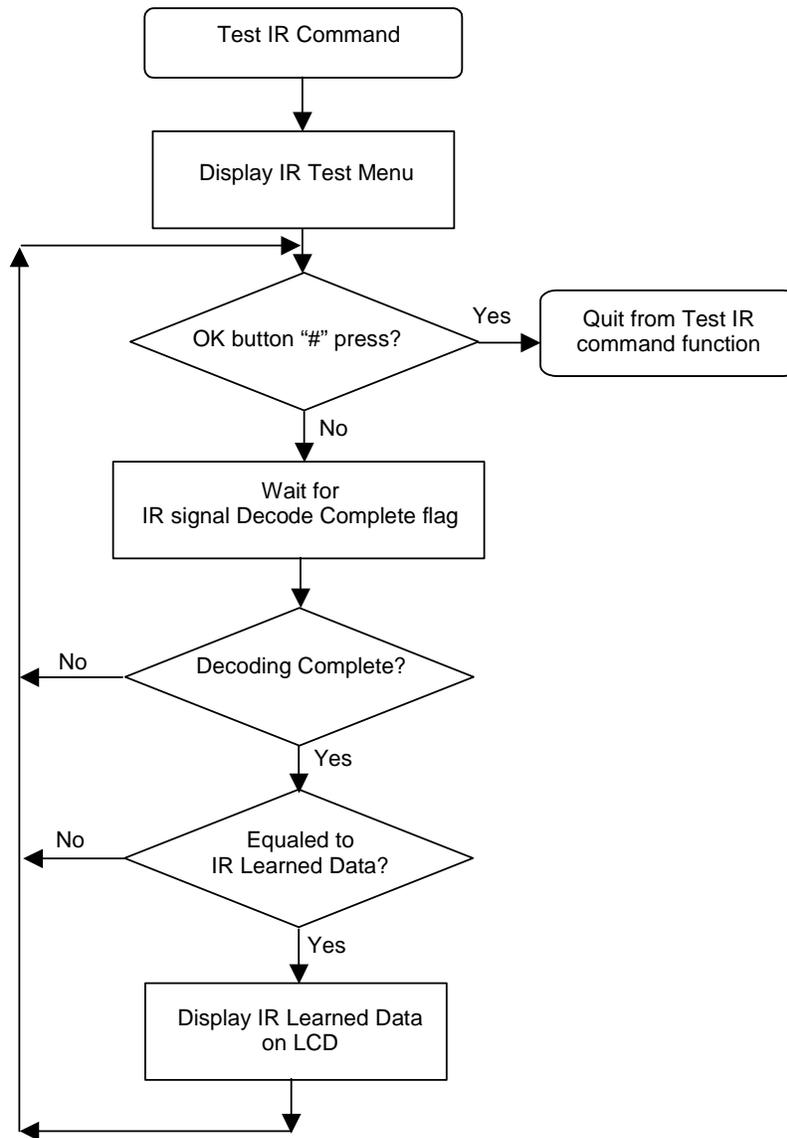
6.6. Infra-Red Remote Test Function



6.6.1. LEARN IR Command Function



6.6.2. Test IR Command Function



6.7. Description of Modules

The demonstration program is generated from the Project Generator (Ver.2.1) under project type: *Application*.

The demonstration program is written to provide user with a ready code to execute in order to kick-start their learning about Renesas Technology microcomputer.

Having understood the demonstration program, user may choose to modify the code to change the performance of some of the demonstrated function. There are only two file needs to be edited by the user.

The first file is *ApplicationDemo.c* file and the next is *Intprg.c* as well as the dependencies files (*ApplicationDemo.h*).

6.7.1. ApplicationDemo.c

This file is also known as the main program of the demonstration program. It contains modules such as Hardware initialization module, Main Menu Display Module, IR Menu Display Menu module, demo selection module, etc.

6.7.2. Intprg.c

This file contains the interrupt service module for IRQ0, Timer A (IR decoding used) and Timer G (IR detection module).

6.7.3. Applicationdemo.h

This file contains all function prototype that use in *ApplicationDemo.c* file.

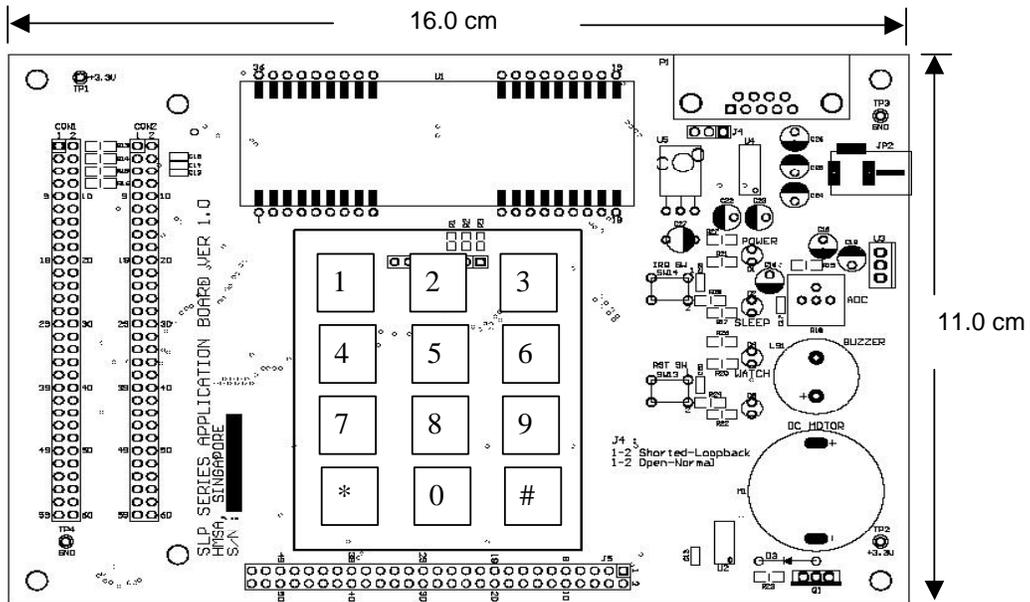
Note: For detailed description of the demonstrated functions, please refer to the source file - *ApplicationDemo.c* file.

7. Trouble-Shooting

Common Failures	Action	Remarks
1. Power LED off	<ul style="list-style-type: none"> <input type="checkbox"/> Check DC input voltage (5v /9v) <input type="checkbox"/> Check PWR LED D1 	Power supply failure : measure TP2 = 3.3v? PWR LED broken
2. Keypad Row 4 ('*', '0', '#') not function during interface with CPUBD	<ul style="list-style-type: none"> <input type="checkbox"/> Check the CPUBD JP10 1-3 short? 	I/O port not enable by jumper
3. Keypad Row 3 ('7', '8', '9') not function during interface with CPUBD	<ul style="list-style-type: none"> <input type="checkbox"/> Check the CPUBD JP10 2-4 short? 	I/O port not enable by jumper
4. Keypad Coloum 3 ('3', '6', '9', '#') not function during interface with CPUBD	<ul style="list-style-type: none"> <input type="checkbox"/> Check the CPUBD JP9 2-4 short? 	I/O port not enable by jumper
5. Buzzer not function during interface with CPU BD	<ul style="list-style-type: none"> <input type="checkbox"/> Check the CPUBD JP8 4-6 short? 	I/O port not enable by jumper
6. LED D2 not function	<ul style="list-style-type: none"> <input type="checkbox"/> Check the CPUBD JP8 3-5 short? 	I/O port not enable by jumper
7. Motor not function	<ul style="list-style-type: none"> <input type="checkbox"/> Check pin 1 of U2 (74HCT04) for PWM signal. <input type="checkbox"/> Check pin 2 of U2 (74HCT04) for PWM signal inverted output. <input type="checkbox"/> Check pin 2 of Q1 for PWM signal <input type="checkbox"/> Check Motor 	Motor failure or motor driver circuit problem
8. Serial Communication Interface not function	<ul style="list-style-type: none"> <input type="checkbox"/> Check J4 1-2 open? <input type="checkbox"/> Check U4 pin 12 for serial data 	RS232 serial transceiver failure, check input and output.
9. Infrared sensor not function	<ul style="list-style-type: none"> <input type="checkbox"/> Check U5 pin 1 for output, pin 2 for 3.3V? <input type="checkbox"/> Disturbing light noise occur when not input [try to shield IR sensor with black tape]? 	

Common Failures	Action	Remarks
10. Current Overdrawn [Current draw more than 200 mA]	<ul style="list-style-type: none"> ❑ Identify short traces and then rework as accordingly. 	Measure low resistance between Vcc with respect to the ground.

Appendix A APPBD – LCD Board Layout



Note:

- The OPTIONAL CON1 & CON2 are Straight Header Housing mounting on solder site, 0.1" @ 2x30 pins.
- Screw hole size is Dia. ϕ =3mm.
- The pin assignment for CON1 & CON2 is given in Appendix B.

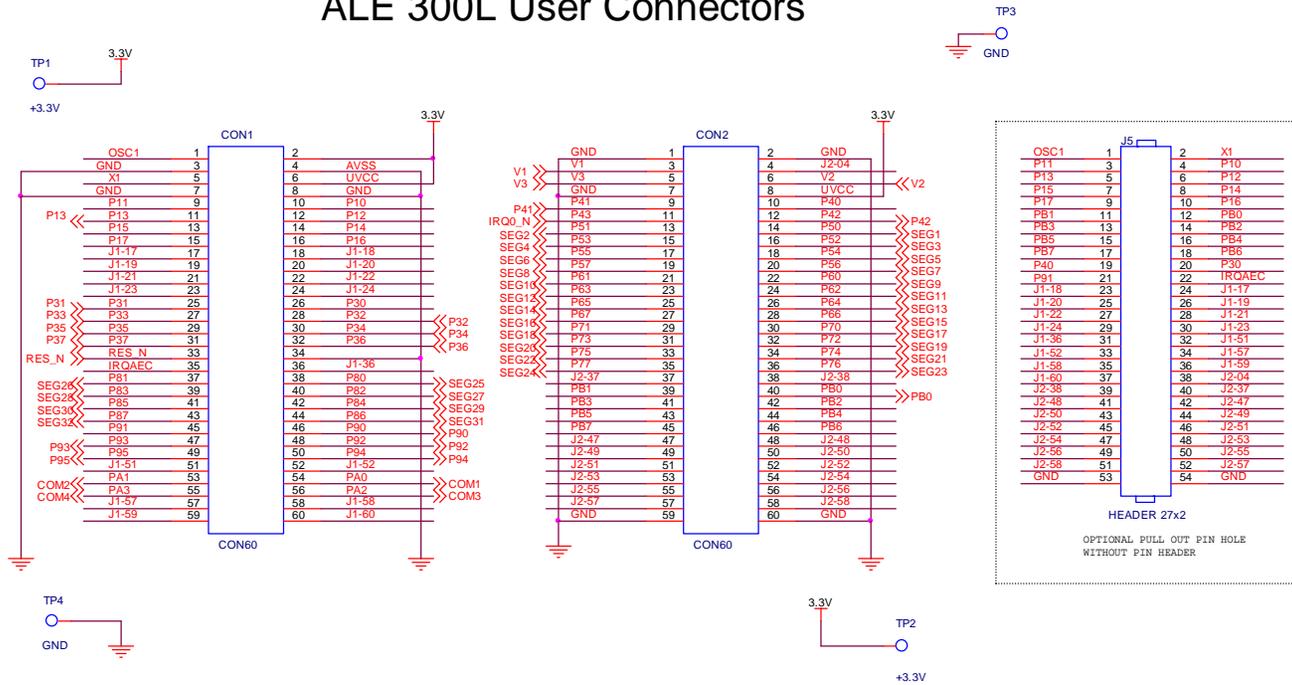
Appendix B Pin Assignment (CON1 & CON2)

CON 1		CON 2	
Pin No.	Signal name	Pin No.	Signal name
1	OSC1	1	GND
2	AVCC	2	GND
3	GND	3	V1
4	AVSS	4	NC
5	X1	5	V3
6	UVCC	6	V2
7	GND	7	GND
8	GND	8	UVCC
9	P11	9	P41/RXD32
10	P10	10	P40/SCK32
11	P13	11	P43/IRQ_N
12	P12	12	P42/TXD32
13	P15	13	P51/SEG2
14	P14	14	P50/SEG1
15	P17	15	P53/SEG4
16	P16	16	P52/SEG3
17	NC	17	P55/SEG6
18	NC	18	P54/SEG5
19	NC	19	P57/SEG8
20	NC	20	P56/SEG7
21	NC	21	P61/SEG10
22	NC	22	P60/SEG9
23	NC	23	P63/SEG12
24	NC	24	P62/SEG11
25	P31/TMOFL	25	P65/SEG14
26	P30	26	P64/SEG13
27	P33	27	P67/SEG16
28	P32/TMOFH	28	P66/SEG15
29	P35	29	P71/SEG18
30	P34	30	P70/SEG17
31	P37/AEVL	31	P73/SEG20
32	P36/AEVH	32	P72/SEG19
33	RES_N	33	P75/SEG22
34	GND	34	P74/SEG21
35	IRQAEC	35	P77/SEG24
36	NC	36	P76/SEG23
37	P81/SEG26	37	NC
38	P80/SEG25	38	NC
39	P83/SEG28	39	PB1/AN1
40	P82/SEG27	40	PB0/AN0

CON 1		CON 2	
Pin No.	Signal name	Pin No.	Signal name
41	P85/SEG30	41	PB3/AN3
42	P84/SEG29	42	PB2/AN2
43	P87/SEG32	43	PB5
44	P86/SEG31	44	PB4
45	P91/PWM2	45	PB7
46	P90/PWM1	46	PB6
47	P93	47	NC
48	P92	48	NC
49	P95	49	NC
50	P94	50	NC
51	NC	51	NC
52	NC	52	NC
53	PA1/COM2	53	NC
54	PA0/COM1	54	NC
55	PA3/COM4	55	NC
56	PA2/COM3	56	NC
57	NC	57	NC
58	NC	58	NC
59	NC	59	GND
60	NC	60	GND

Appendix C Schematic Drawings

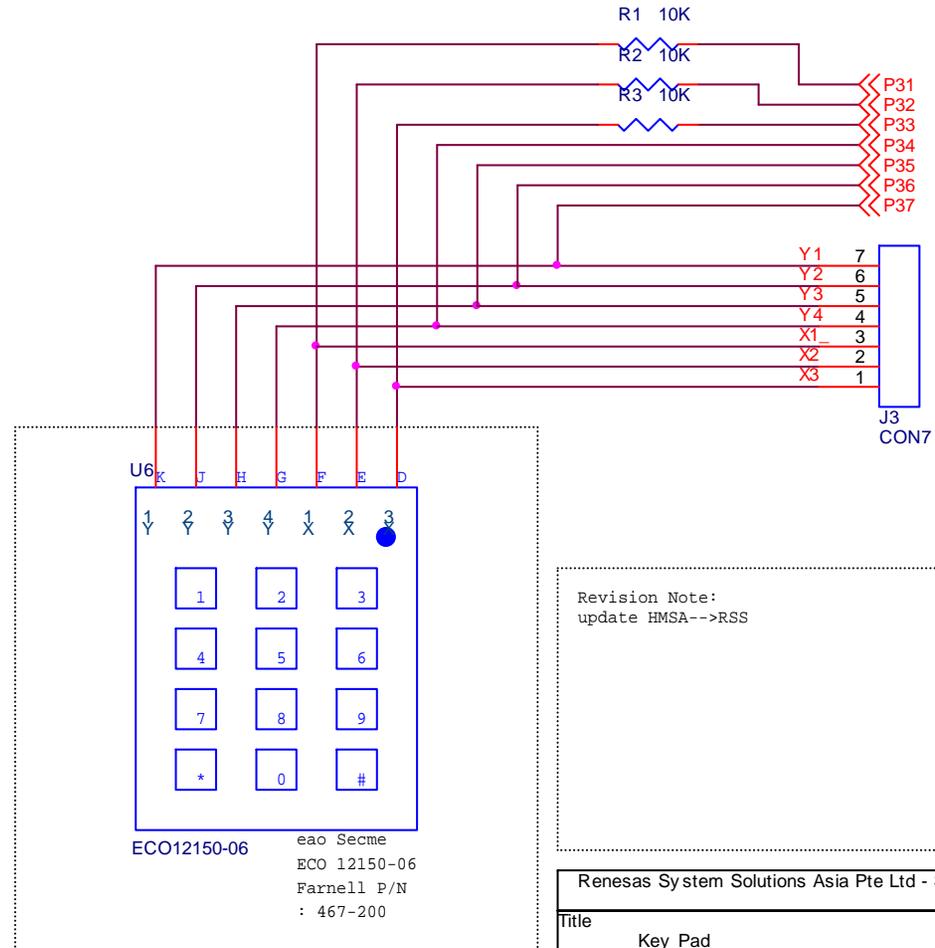
ALE 300L User Connectors



Revision Note:
update BMSA-->RSS

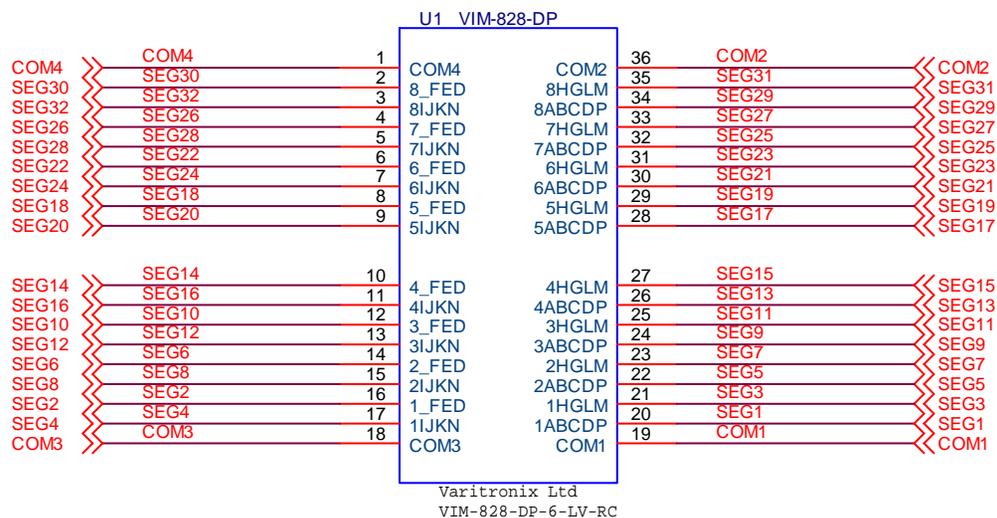
Renesas System Solutions Asia Pte Ltd - Singapore Design Centre			
Title User Connectors to ALE 300L Emulator			
Size A3	Document Number	Drawn by : = L.S. Lim & C.L.San	Rev 1.2
Date:	Tuesday, April 01, 2003	Sheet	1 of 5

Key Pad Circuitry

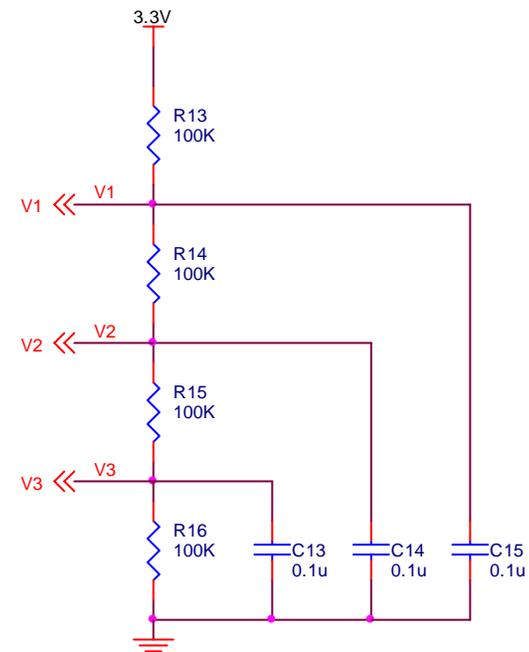


Renesas System Solutions Asia Pte Ltd - Singapore Design Centre		
Title Key Pad		
Size A	Document Number <Doc>	Rev 1.2
Date:	Tuesday, April 01, 2003	Drawn by = L.S.Lim & C.L.Sam Sheet 2 of 5

LCD PANEL

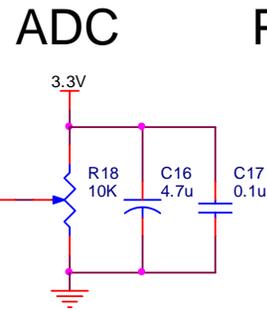
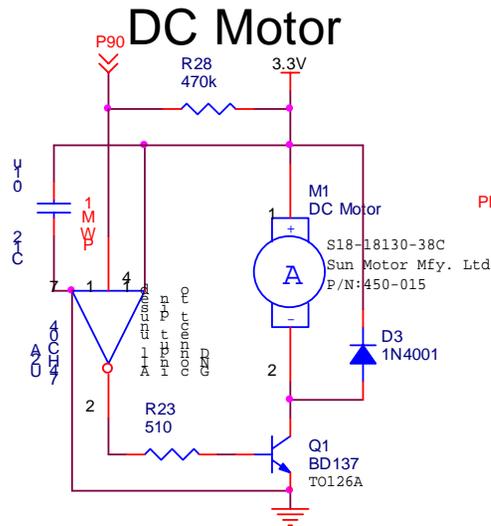


BOOSTER CIRCUIT



Revision Note:
update HMSA-->RSS

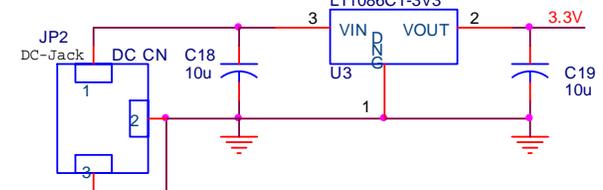
Renesas System Solutions Asia Pte Ltd - Singapore Design Centre			
Title LCD			
Size A	Document Number <Doc>	Drawn by = L.S.Lim & C.L.Sam	Rev 1.2
Date:	Tuesday, April 01, 2003	Sheet	3 of 5



P93, P94 & P95 are large-current port pins (10mA/pin)

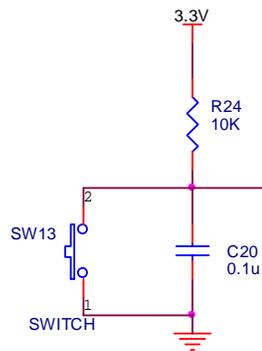
POWER SUPPLY

Linear Tech.
LT1086CT-3V3
TO220

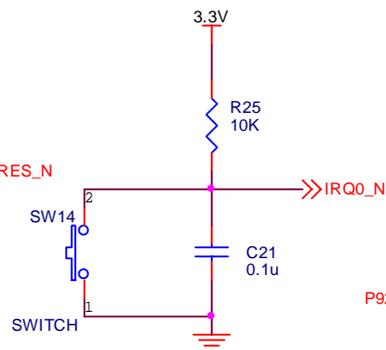


Revision Note:
-Add R28 (470k) to DC motor Block
-unused input pin for U2 should be connect to ground
-HM5A --> RSS

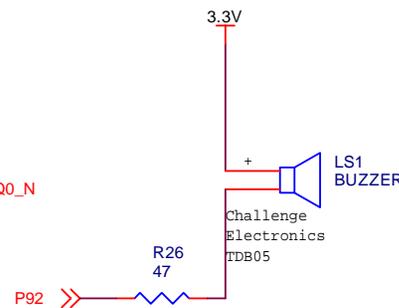
Reset



IRQ0

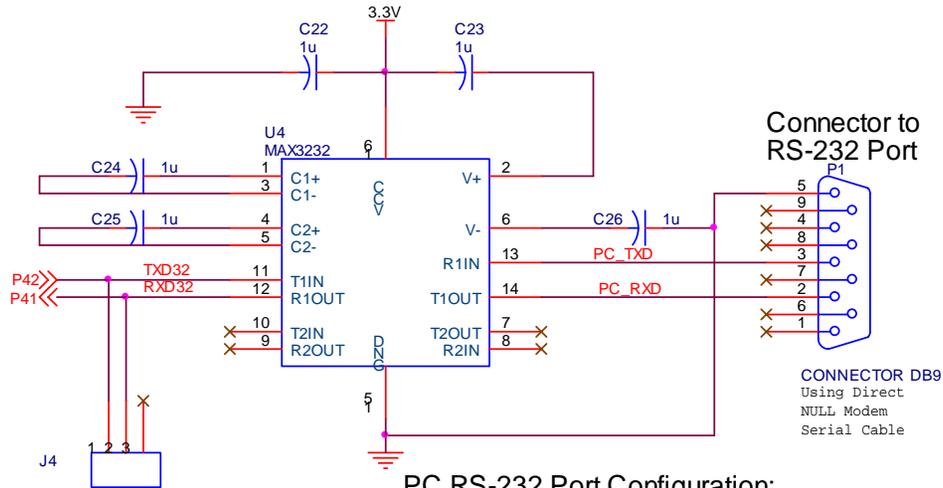


Buzzer



Renesas System Solutions Asia Pte Ltd - Singapore Design Centre			
Title Miscellaneous			
Size A	Document Number <Doc>	Drawn by = L.S.Lim & C.L.Sam	Rev 1.2
Date:	Tuesday, April 01, 2003	Sheet	4 of 5

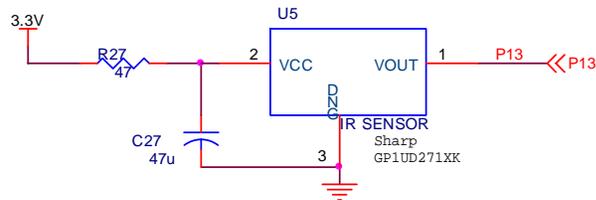
Serial Communication Interface



J4
1-2 shorted : Loopback Test
1-2 open : Normal Operation

PC RS-232 Port Configuration:
Baud Rate : 19200
Data : 8 bits
Parity : None
Stop : 1 bit
Flow control : None

IR SENSOR CIRCUIT



Revision Note:
Swap U4 pin 13
and pin 14 for "Direct
Connection"
HMSA --> RSS

Renesas System Solutions Asia Pte Ltd - Singapore Design Centre		
Title Serial Communication Interface		
Size A	Document Number <Doc>	Rev 1.2
Date: Tuesday, April 01, 2003	Drawn by = L.S.Lim & C.L.Sam	Sheet 5 of 5

Appendix D Bill of Materials

Items	Designator					P/N Code	Part Description	Qty	Package	Mfg
A) Board H8/38024F Application										
1						AA-02130-2	PCB SLP SUB Board Rev 1.1	1		any
2						BT-02017-1	Screw Pan M2.0x12mm Std Steel	4		any
3						BT-40010-1	Washer M2.0 Flat Std Steel	4		any
4						BT-41010-1	Washer M2.0 Split Lock Std Steel	4		any
5						BT-50010-1	Nut M2.0 Std Steel	12		any
6	C1	C2	C3	C4	C5	CA-74101-3	Capacitor SMD 0805 100nF / 50V 10%	6	0805	AVX / any
7	C6	C7	C8	C9	C10	CA-74101-3	Capacitor SMD 0805 100nF / 50V 10%			
8	C11	C12	C13	C14	C15	CA-74101-3	Capacitor SMD 0805 100nF / 50V 10%			
9	C17	C20	C21			CA-74101-3	Capacitor SMD 0805 100nF / 50V 10%			
10	C22	C23	C24	C25	C26	CE-15105-1	Capacitor Ele GSS-R 1uF/50V	5	thru-hole	Rubycon / any
11	C16					CE-15475-0	Capacitor Ele GSM-R 4u7F / 50V	1	thru-hole	Rubycon / any
12	C27					CE-16470-1	Capacitor Ele GSS-R 47uF/6V3	1	thru-hole	Rubycon / any
13	D3					DQ-14001-0	Diode GP 1N4001	1	thru-hole	MIC
14	U1x4					KA-15109-0	Socket IC Tum Pin 09-Way SIL	4	thru-hole	AUK
15	J1	J2				KH-20180-1	Header Pin 0.100" 2x30-Way Gold	2	thru-hole	AUK
16	JP2					KP-99501-0	Socket DC Jack 2.1mm PCB Mt	1	thru-hole	AUK
17	P1					KS-60309-0	Connector D-Sub Female 9-Way RA	1	thru-hole	AUK
18	U1					LC-10081-0	LCD VIM 828	1	thru-hole	
19	D1					LE-03121-0	LED 3mm Green Diffused	1	thru-hole	MIC
20	D2	D4	D5			LE-03321-0	LED 3mm Red Diffused	3	thru-hole	MIC
21	U5					LR-39001-0	Photodiode GP1UD271XK	1	thru-hole	Sharp
22	Q1					QB-10137-0	Transistor BD137	1	thru-hole	Fairchild
23	R28					RA-36471-0	Resistor SMD 1206 1/8W 1% 470K	1	1206	any
24	R19					RA-62222-0	Resistor SMD 1206 1/4W 2% 22R	1	1206	any
25	R26	R27				RA-62472-0	Resistor SMD 1206 1/4W 2% 47R	2	1206	any
26	R17	R20	R21	R22		RA-63222-0	Resistor SMD 1206 1/4W 2% 220R	4	1206	any
27	R23					RA-63512-0	Resistor SMD 1206 1/4W 2% 510R	1	1206	any
28	R1	R2	R3	R4	R5	RA-65102-0	Resistor SMD 1206 1/4W 2% 10K	2	1206	any
29	R6	R7	R8	R9	R10	RA-66102-0	Resistor SMD 1206 1/4W 2% 100K	4	1206	any
30	R11	R12	R24	R25		RT-81041-1	Resistor Trim S-T 10K GF06P2B103M	1	thru-hole	TOCOS
31	SW13	SW14				SP-10011-0	Switch Tactile Round	2	thru-hole	KIE / any
32						SZ-00001-0	Keypad 12Way 4x3 ECO 12150 06	1	thru-hole	ECO
33	U2					UC-80004-1	IC 74HCT04D Hex Inverter w/ TTL Input	1	SO14	Fairchild
34	U4					UF-53232-0	IC SP3232ECT RS232 Driver /Receiver	1	SO 150	Sipex
35	U3					UR-01086-0	ICLT1086CT-3V3 Voltage Regulator 1.5A	1	TO-220	Linear Tech
36	M1					XM-00003-0	Motor 1.5-4.5 Vdc	1	thru-hole	Farnell
37	LS1					XS-02005-0	Buzzer 5V PCB Mt	1		Sound Tech
38							Anti-Static Bag	1		any
39							Label for Serial Number	1		any
B) Packaging										
40						BA-61007-0	Rubber Foot Stick On SJ5008	4		
41						BZ-00053-0	Box RSC ST-04 320"x340"x190"	1		
42							Anti-Static Bag for Accessories	6		
43							Bubble Foam	1		
44							Checking List Form	1		
45							Label for Carton Box	1		
46							Manual in CR-ROM format w/Label & Cover	1		
C) Optional Items										
47						WL-64003-0	Battery Cable Assembly Rev 1.0	1		
48						WL-64004-0	Supply Cable Assembly Rev1.0	1		

Renesas Technology (Asia Sales Offices)

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

APPBD-LCD

