

# LCD Application Board V2

User's Manual

RENESAS STARTER KIT

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## Precautions

The following precautions should be observed when operating any RSK Application Board:

This RSK Application Board is only intended for use in a laboratory environment under ambient temperature and humidity conditions. A safe separation distance should be used between this and any sensitive equipment. Its use outside the laboratory, classroom, study area or similar such area invalidates conformity with the protection requirements of the Electromagnetic Compatibility Directive and could lead to prosecution.

The product generates, uses, and can radiate radio frequency energy and may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception, which can be determined by turning the equipment off or on, you are encouraged to try to correct the interference by one or more of the following measures;

- ensure attached cables do not lie across the equipment
- reorient the receiving antenna
- increase the distance between the equipment and the receiver
- connect the equipment into an outlet on a circuit different from that which the receiver is connected
- power down the equipment when not in use
- consult the dealer or an experienced radio/TV technician for help NOTE: It is recommended that wherever possible shielded interface cables are used.

The product is potentially susceptible to certain EMC phenomena. To mitigate against them it is recommended that the following measures be undertaken;

- The user is advised that mobile phones should not be used within 10m of the product when in use.
- The user is advised to take ESD precautions when handling the equipment.

The RSK Application Board does not represent an ideal reference design for an end product and does not fulfil the regulatory standards for an end product.

# How to Use This Manual

## 1. Purpose and Target Readers

This manual is designed to provide the user with an understanding of the RSK Application Board hardware functionality, and electrical characteristics. It is intended for users designing sample code on the RSK platform, using the many different incorporated peripheral devices.

The manual comprises of an overview of the capabilities of the RSK Application Board product, but does not intend to be a guide to embedded programming or hardware design. Further details regarding setting up an RSK for use with this Application Board may be found in the RSK's Tutorial Manual.

Particular attention should be paid to the precautionary notes when using the manual. These notes occur within the body of the text, at the end of each section, and in the Usage Notes section.

The revision history summarizes the locations of revisions and additions. It does not list all revisions. Refer to the text of the manual for details.

The following documents apply to the LCD Application Board. Make sure to refer to the latest versions of these documents. The newest versions of the documents listed may be obtained from the Renesas Electronics Web site.

Document Type	Description	Document Title	Document No.
User's Manual	Describes the technical details of the RSK Application Board hardware.	LCD Application Board V2 User's Manual	R20UT2518EG
Quick Start Guide	Provides simple instructions to setup the RSK and run the first sample, on a single A4 sheet.	LCD Application Board V2 Quick Start Guide	R20UT2519EG
Schematics	Full detail circuit schematics of the Application Board	LCD Application Board V2 Schematics	REG99J0041

## 2. List of Abbreviations and Acronyms

Abbreviation	Full Form
CPU	Central Processing Unit
E1	On-chip Debugger
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MCU	Micro-controller Unit
RSK	Renesas Starter Kit

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## 1. Overview

### 1.1 Purpose

This RSK Application Board is an evaluation tool for Renesas microcontrollers with an LCD driver interface. It is used in conjunction with the RSK for the microcontroller to be evaluated.

### 1.2 Features

This RSK Application Board provides the following features:

- Simple mounting connections for LCD to fit on top of RSK.
- Interface to standard RSK LCD expansion connector and RSK expansion connections.
- LCD is powered straight from the MCU, requiring no extra connections
- 176 segment display, consisting of:
  - Large 3 digit numerical display, with decimal point
  - 5 digit numerical display, with decimal point & clock colon
  - 6 digit alphanumerical display
  - 4 bar battery gauge, and 6 bar graph
  - Day of the week indicators
  - 17 miscellaneous symbols

## 2. Board Layout

### 2.1 Component Layout

Figure 2-1 below shows the functions of the components on the board.

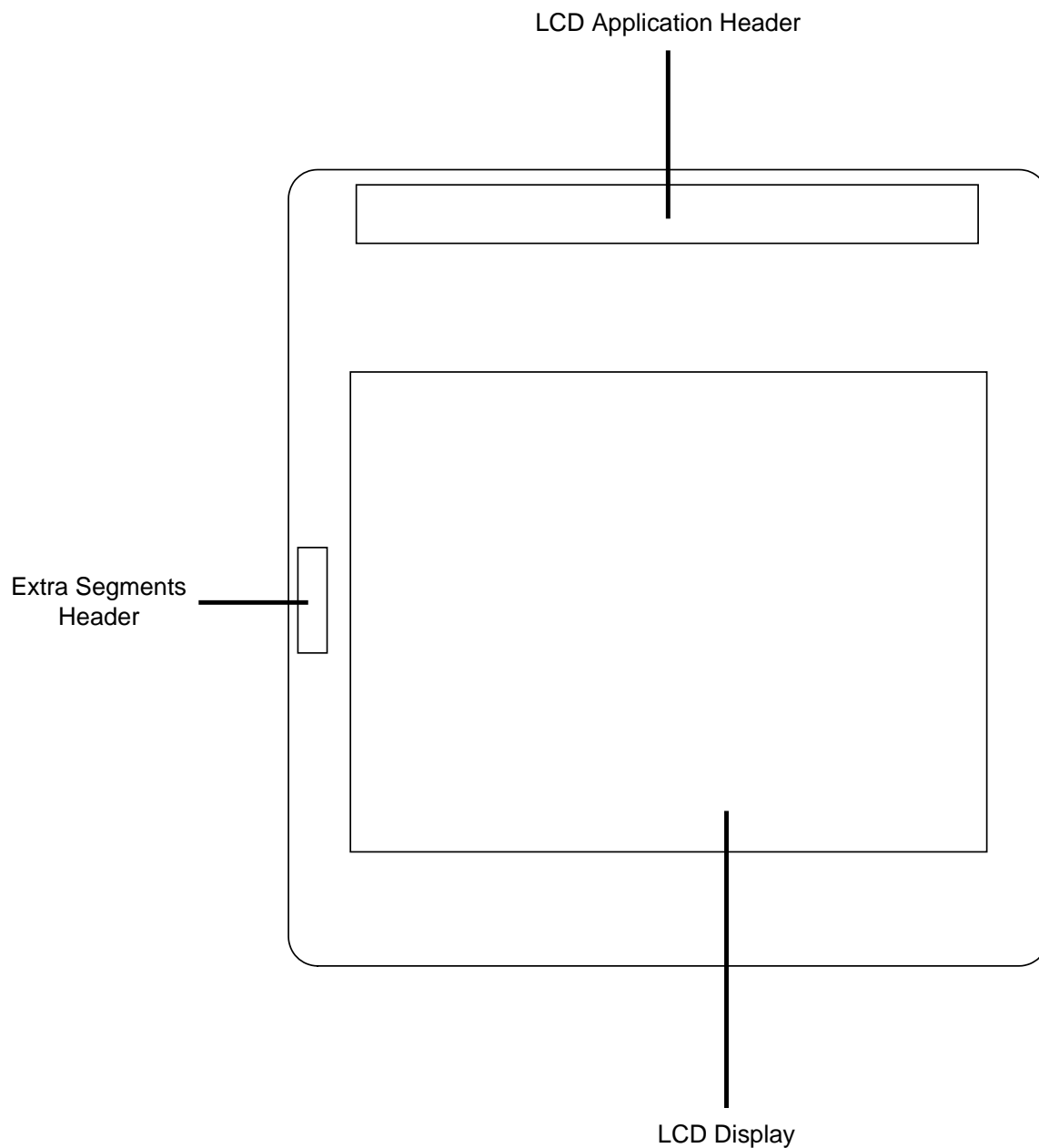
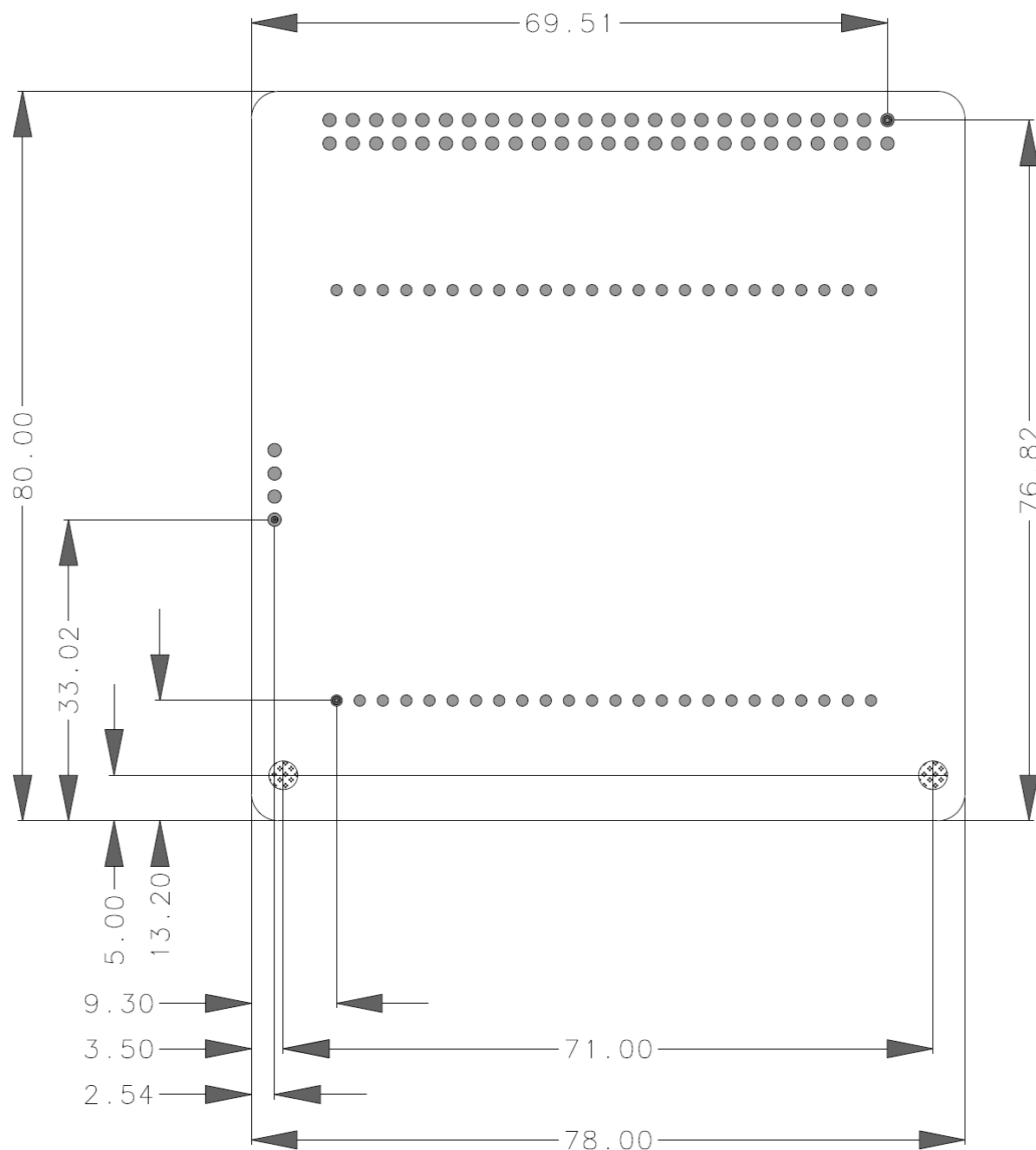


Figure 2-1: Board Dimensions



## 2.2 Board Dimensions

**Figure 2-2** below gives the board dimensions and connector positions. All through hole connectors are on a common 0.1" grid for easy interfacing.



**Figure 2-2: Board Dimensions**

## 2.3 Component Reference

Figure 2-3 below shows the component references for the board.

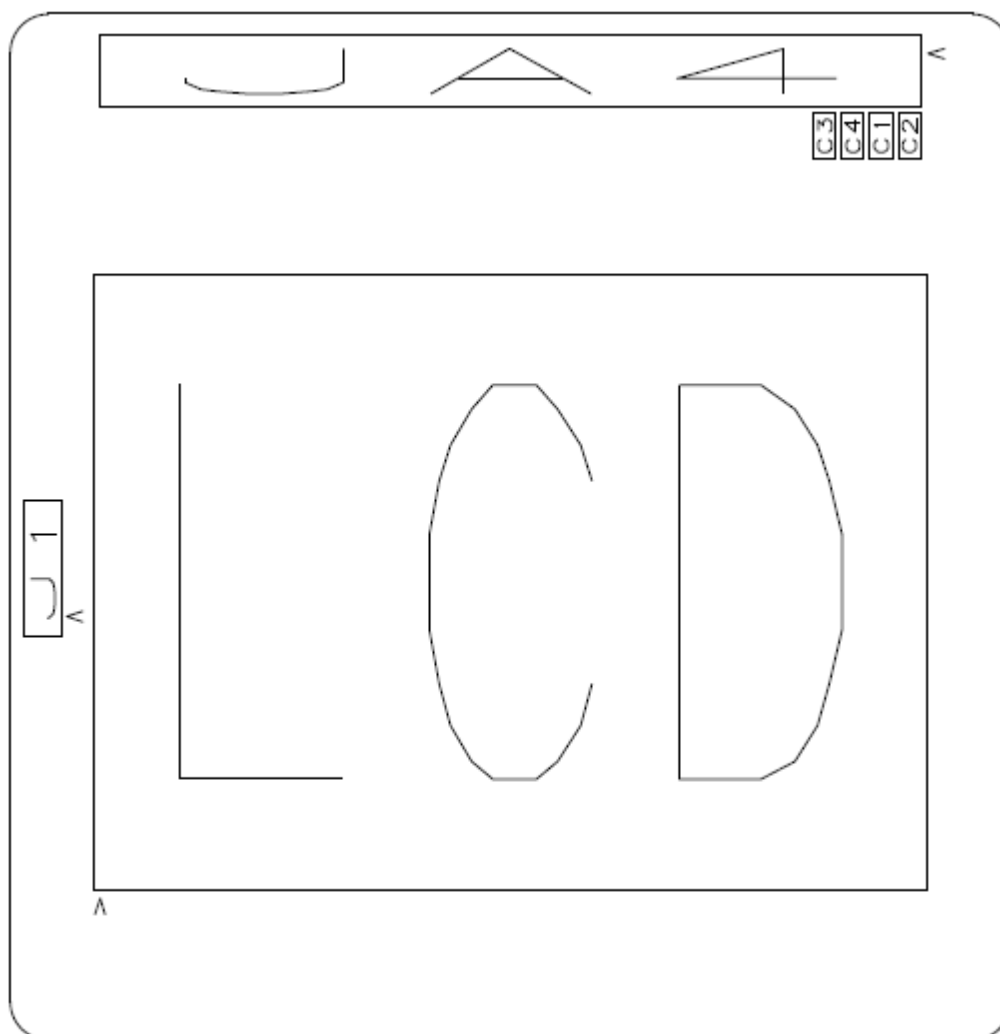


Figure 2-3: Component References

## 3. Installation & Specifications

### 3.1 Assembly and Interfacing

The LCD Application Board is fitted with a 50 way header marked as 'JA4' and RSK board is fitted with a 50 way socket marked as 'JA4'. The nylon pillars should be screwed onto the LCDAPPV2 board via the two holes located at the bottom of the PCB. The LCD Application Board should plug into the fitted socket on the top side of the RSK. Please refer to figure 3-1 for further details regarding assembly, and 3-2 for fitting details.

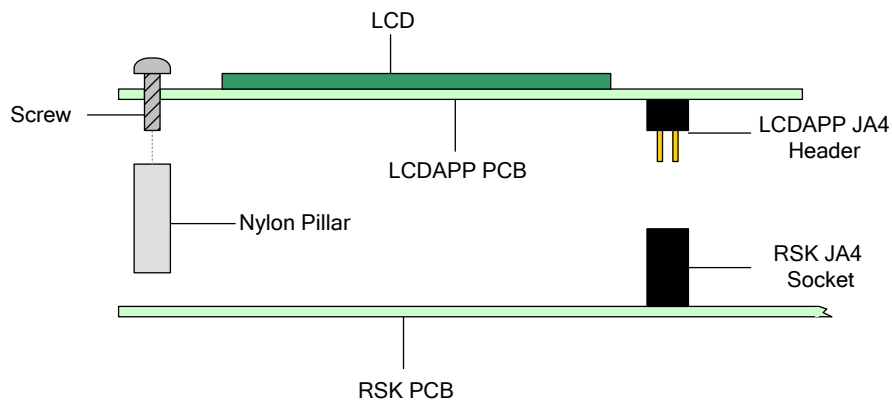


Figure 3-1: Assembly Diagram

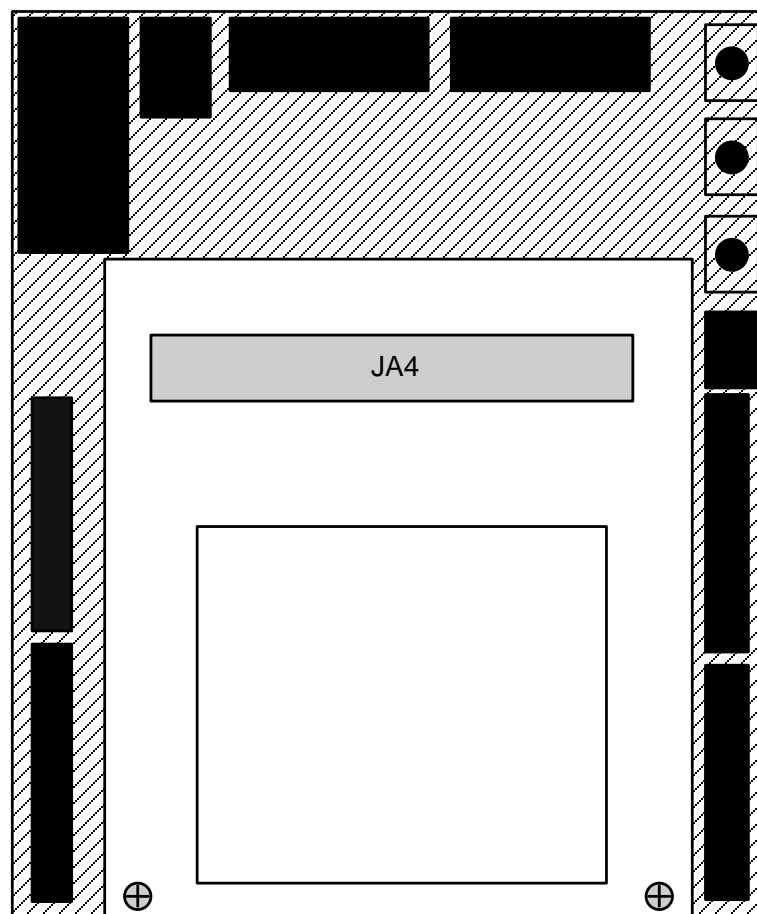


Figure 3-2: Board Fitting Diagram



## 4. Headers

### 4.1 LCD Application Header

Due to technical limitations, the connection between the LCDAPPV2 and RSK devices does not preserve net names. The header details are listed here, and should be used as a lookup table when attempting to access specific segments on the LCDAPPV2 board manually.

JA4					
Pin	Generic Header Name	LCDAPPV2	Pin	Generic Header Name	LCDAPPV2
1	V1	V1	2	V2	V2
3	V3	V3	4	V4	V4
5	GROUND	GND	6	GROUND	GND
7	COM1	COM1	8	COM2	COM2
9	COM3	COM3	10	COM4	COM4
11	SEG1	SEG3	12	SEG2	SEG4
13	SEG3	SEG5	14	SEG4	SEG6
15	SEG5	SEG7	16	SEG6	SEG8
17	SEG7	SEG9	18	SEG8	SEG10
19	SEG9	SEG11	20	SEG10	SEG12
21	SEG11	SEG13	22	SEG12	SEG14
23	SEG13	SEG15	24	SEG14	SEG16
25	SEG15	SEG17	26	SEG16	SEG18
27	SEG17	SEG19	28	SEG18	SEG20
29	SEG19	SEG21	30	SEG20	SEG22
31	SEG21	SEG23	32	SEG22	SEG24
33	SEG23	SEG25	34	SEG24	SEG26
35	SEG25	SEG27	36	SEG26	SEG28
37	SEG27	SEG29	38	SEG28	SEG30
39	SEG29	SEG31	40	SEG30	SEG32
41	SEG31	SEG33	42	SEG32	SEG34
43	SEG33	SEG35	44	SEG34	SEG36
45	SEG35	SEG37	46	SEG36	SEG38
47	SEG37	SEG39	48	SEG38	SEG40
49	SEG39	SEG41	50	SEG40	SEG42

Table 4-1 JA4 LCD Expansion Connector

## 5. Modifications

### 5.1 Using the Unconnected Segments

Due to limitations in the LCD Application Header (JA4), 4 of the LCD segment pins have been disconnected. The pins unconnected are 5, 6, 47 & 48. They can however be accessed via J1 on the LCDAPPV2 board. By connecting the pins to unused LCD segment pins on the RSK, unsupported segments can be used.

### 5.2 Capacitors

Pads are supplied to allow 0603 capacitors to be placed on the LCD drive voltages V1 – V4 (Components C1, C2, C3, C4 marked DNF).

## 6. Additional Information

### Technical Support

For details on how to use the RSK or development tools, refer to the manuals available on the CD/DVD or from the web site.

### Technical Contact Details

***Please refer to the contact details listed in section 3 of the “Quick Start Guide”***

General information on Renesas microcontrollers can be found on the Renesas website at:

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