

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.

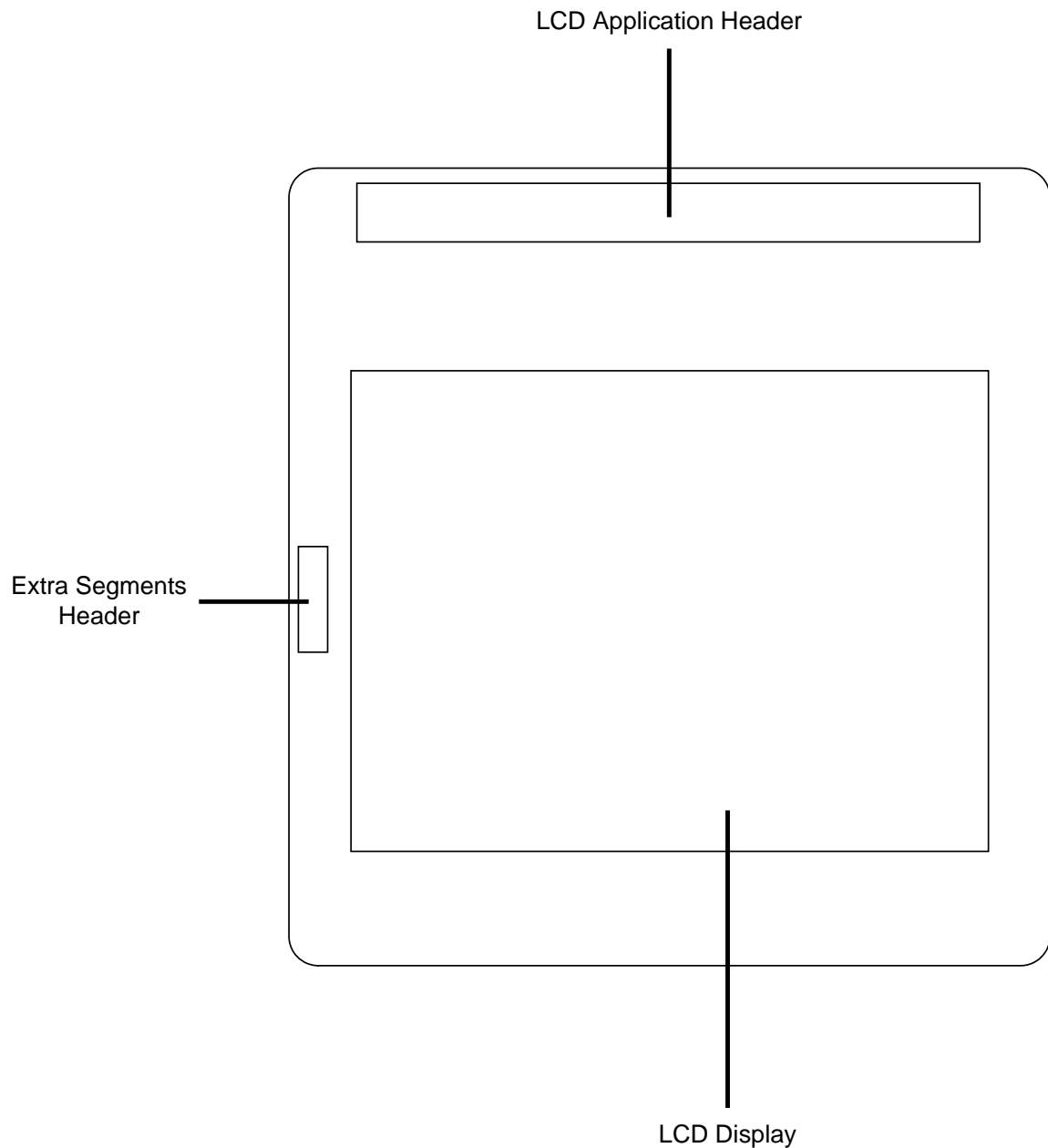


Figure 2-1: Board Dimensions

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.

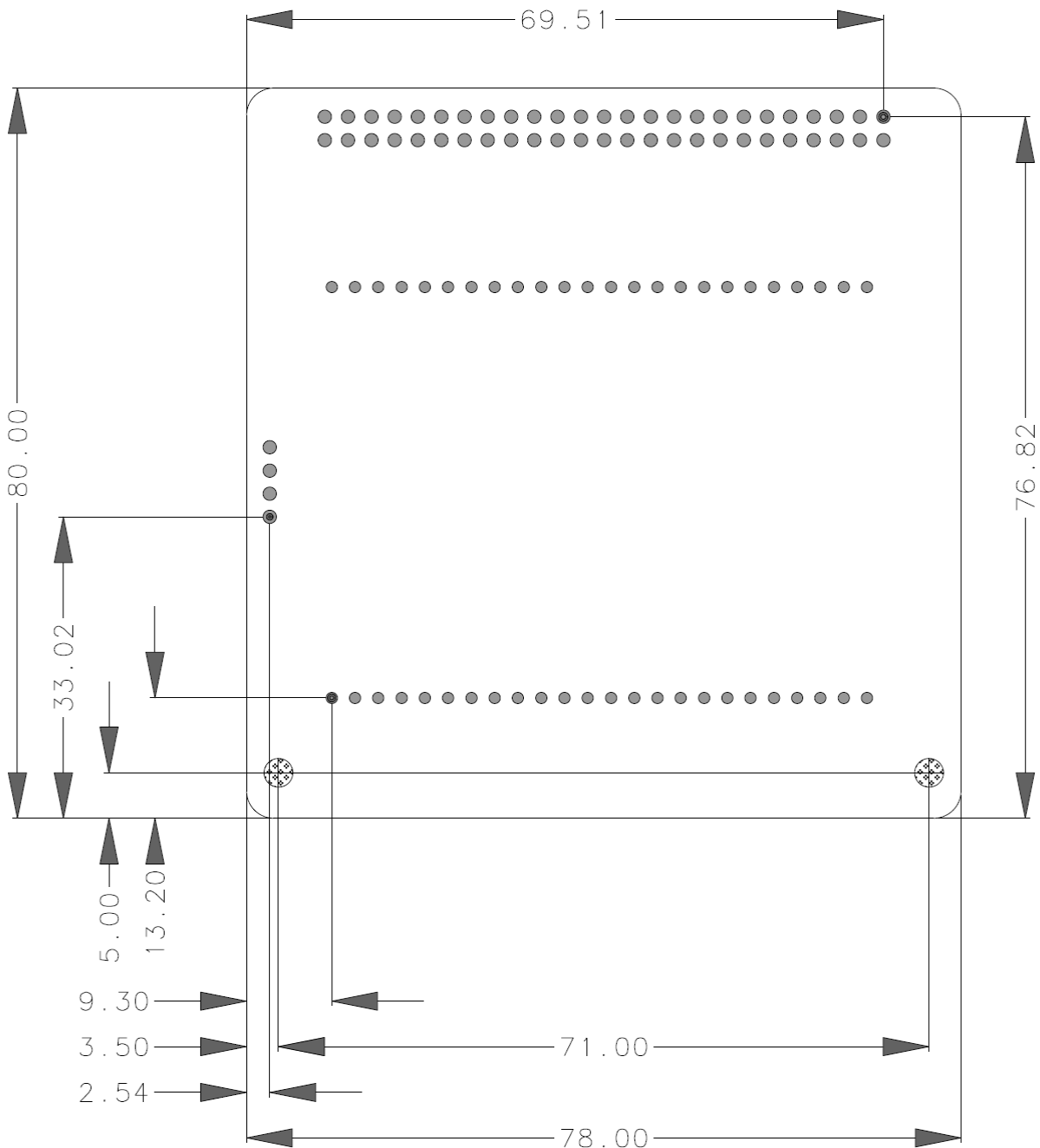


Figure 2-2: Board Dimensions

2.3 Component Reference

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

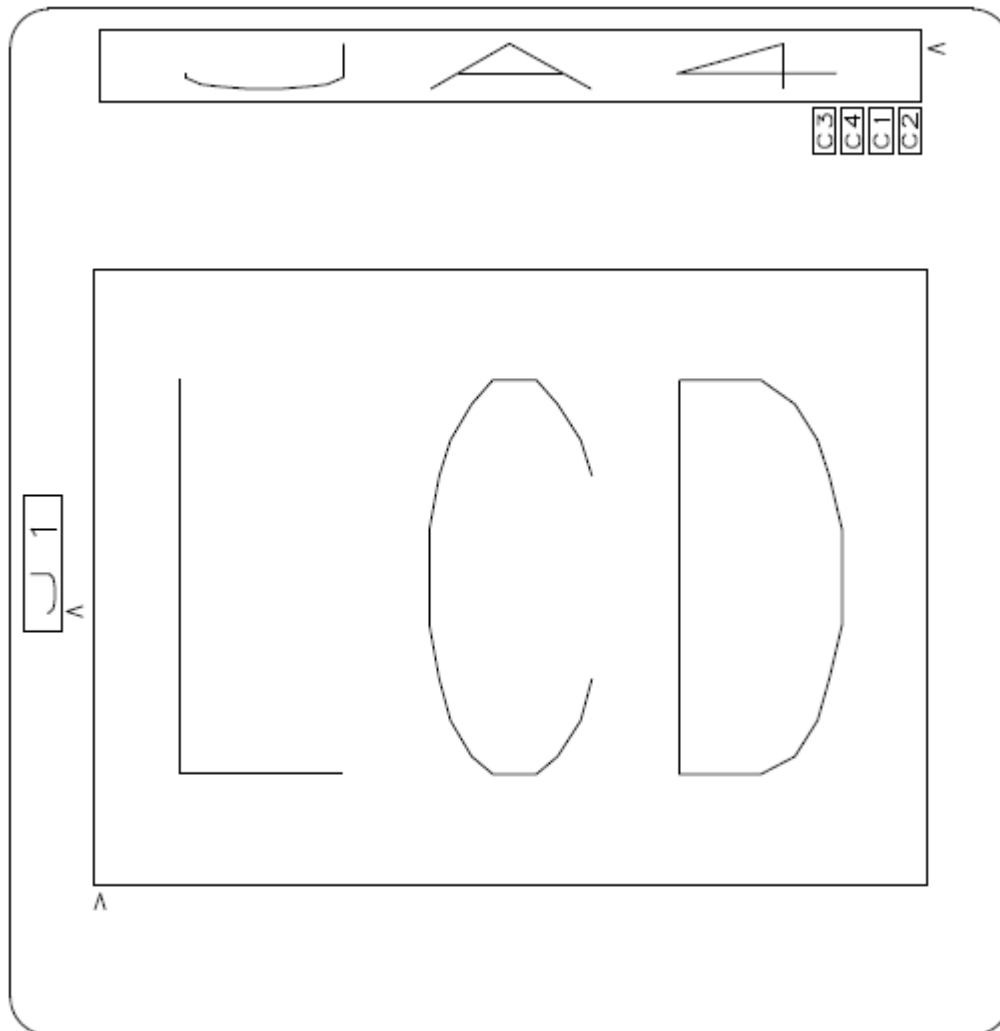


Figure 2-3: Component References

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.

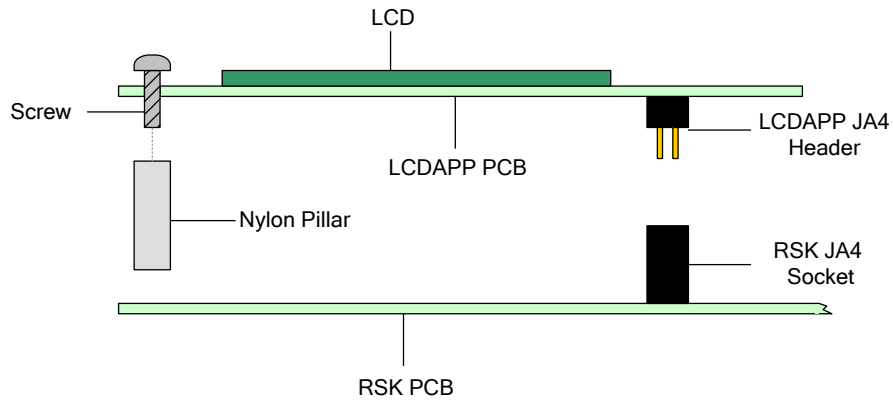


Figure 3-1: Assembly Diagram

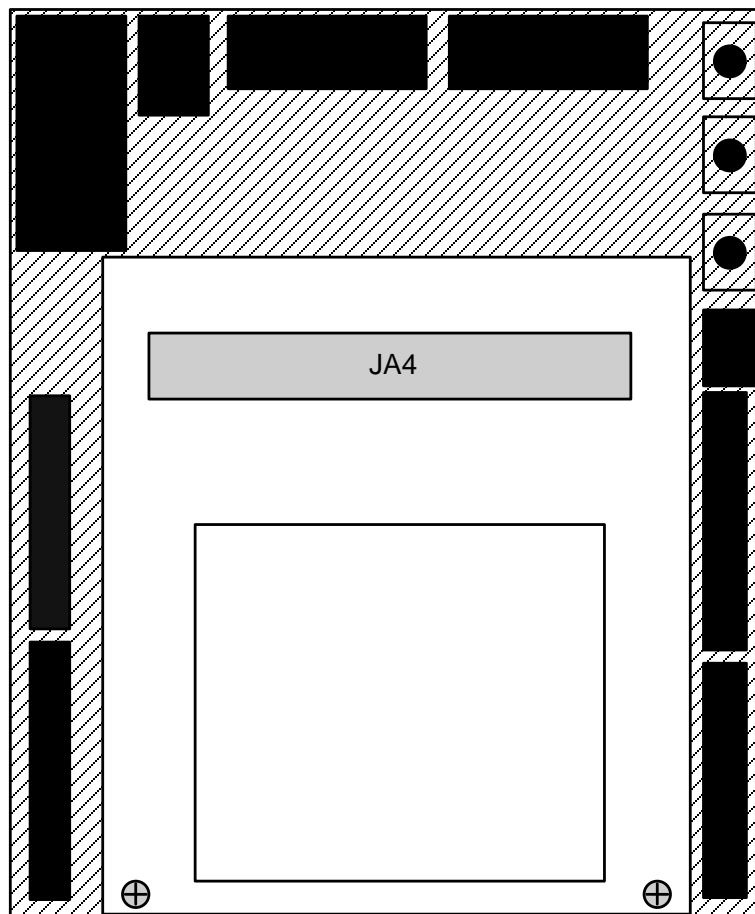


Figure 3-2: Board Fitting Diagram

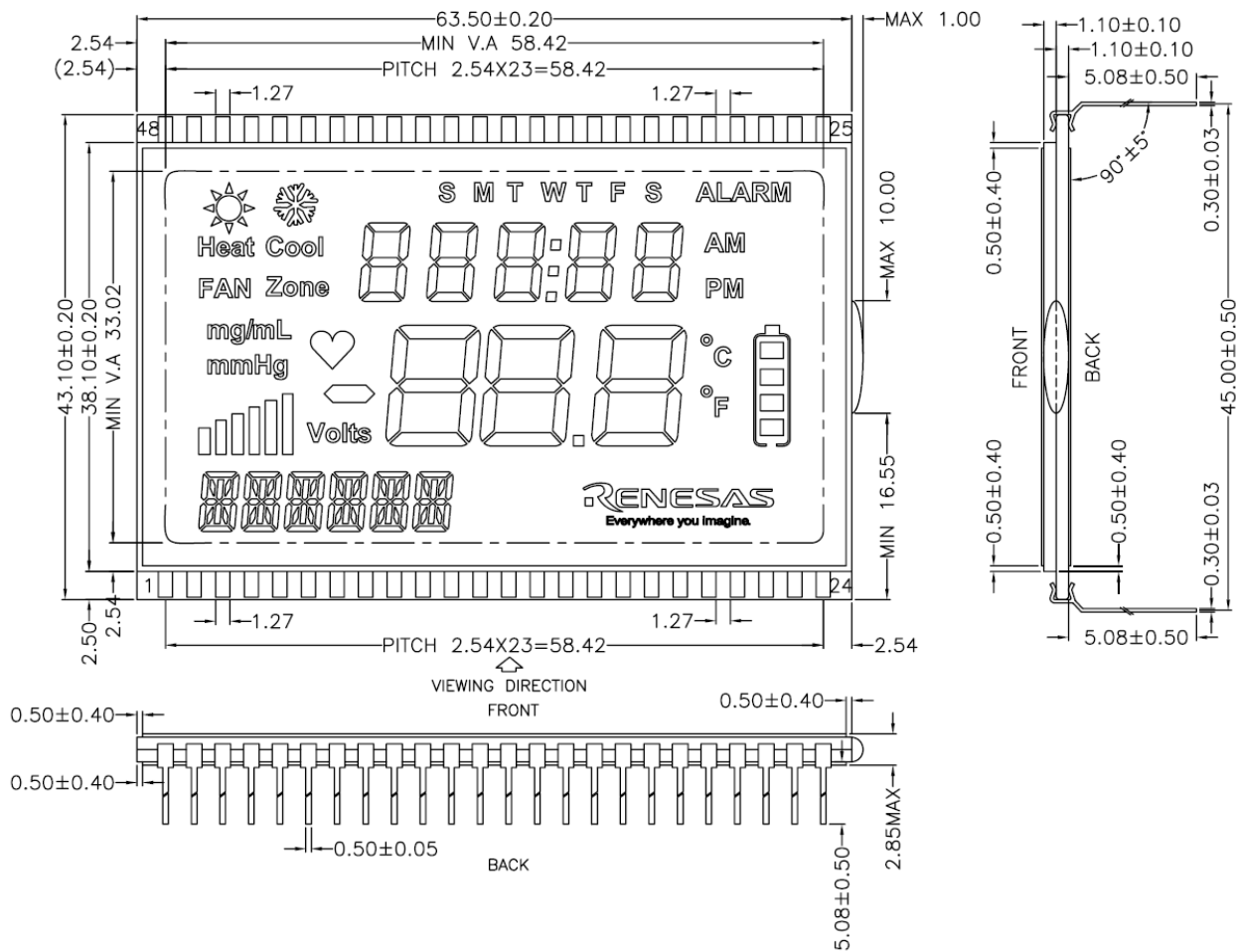
3.2 LCD Module Specifications

The LCD module fitted to the LCDAPPV2 board is a custom glass, twisted nematic device.

Specifications:

- 176 Segments, 48 Pins
- 1/4 Duty Cycle, Using 4 Common Pins
- 4.2V Operating Voltage, 1/3 Voltage Bias
- 6 O'clock Viewing Direction, Reflective Positive

Please refer the LCD Glass datasheet for further details



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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