4DCAPE-70T

Datasheet

Contents

1. Description

The 4D 7.0" LCD CAPE is a cape specifically designed for the Beagle Bone Black (BBB), and provides a 7.0" primary display for the BBB for direct user interaction and information display, along with the ability for additional CAPES to be attached at the same time.

The 4DCAPE is **not** compatible with the previous Beagle Bone (Beagle Bone White), and can only be used with the Beagle Bone Black.

The 4D 7.0" LCD CAPE features a 7.0" TFT LCD 800x480 resolution display with Resistive Touch.

The 4DCAPE-70T uses the drivers developed for the CircuitCo LCD7 00A3, however, provides a different form factor and pricing point to the LCD7.

The Beagle Bone Black connects directly to the back of the 4DCAPE-70T and provides everything the CAPE requires such as power and display signals. Another CAPE can be added to the secondary connectors on the back of the 4DCAPE-70T if required.

The 4D 7.0" LCD CAPE features 7 push buttons below the screen, LEFT, RIGHT, UP, DOWN, ENTER, RESET and POWER, along with 2 LEDs to indicate Power and User Status (normally heartbeat).

Mounting of the 4DCAPE-7.0T is achieved with the 4x 3.5mm mounting holes present on the CAPE, enabling standard M3 or #6-32 screws to fasten the 4DCAPE-7.0 as required.

2. Features

- 7.0" TFT LCD CAPE for the Beagle Bone Black

- 800x480 Resolution 7.0" TFT LCD Display with Resistive Touch (4DCAPE-70T-II), or non-touch (4DCAPE-70-II)

- 7 optional push buttons via an external button board are available, enabling LEFT, RIGHT, UP, DOWN, ENTER, RESET and POWER functionality.

- 2 LED Lights for Power and User Activity

- 2x2 Jumper with shunts for EEPROM CAPE ID selection

- Module dimensions: 179.9 x 100.0 x 21.4mm

- Module dimensions with Beagle Bone Black connected: Approx 179.9 x 100.0 x 29.0mm

- 4x 3.5mm Mounting holes

- RoHS and CE Compliant.
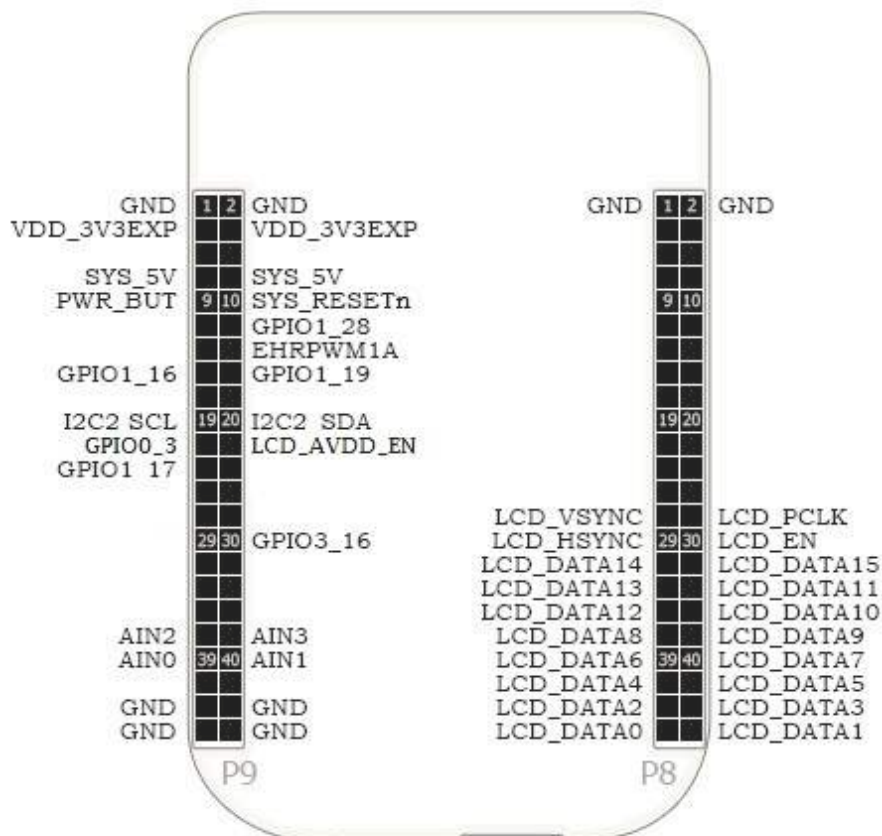
Used pins for 4DCAPE-70T (Header's P1)

3. Getting Started

3.1. Requirements

The 4D 7.0" LCD CAPE is designed to work with existing software and drivers already developed for LCD CAPES for the Beagle Bone Black.

The Requirements for use are:

- 4DCAPE-70-II or 4DCAPE-70T-II Cape
- Beagle Bone Black (BBB) with suitable distribution loaded
- 5V DC Supply suitable for the Beagle Bone Black recommended 2A @ 5V.
- A Stylus is recommended for accurate touch, however, is not required.

3.2. How to use the 4D 7.0" LCD CAPE

The following steps should be all that is required to use the 4DCAPE-70DT:

1. Connect the 4DCAPE-70T to the Beagle Bone Black while the Beagle Bone Black is not powered. The outline of the BBB is printed on the back of the 4DCAPE-70T as a guide for orientation.

2. If using with other capes, ensure the 4DCAPE-70T is not conflicting pin-wise with any other cape installed.

3. Ensure the DIP Switch on the CAPE is set to a different EEPROM ID than any other capes.

4. Ensure your Beagle Bone Black is loaded with a suitable Linux distribution that is compatible with the existing CircuitCo LCD7 00A3 CAPE or 4D Systems 4DCAPE-70T. Angstrom release 20.06.2013 or later is required. Android 4.2.2 has also been tested and functions correctly. Other distributions may also be compatible with this display.

5. Connect a 5V Supply to the DC Jack of the Beagle Bone Black. It is recommended to use a 2A supply to ensure sufficient supply.

6. Once power is connected, something should be displayed on the 4DCAPE-70T as it is booted. Once booted, the system should automatically log in (assuming Angstrom Linux distribution is used), and the Touch Screen Calibration Utility should load automatically. If using the 4DCAPE-70T without touch, this can be exited and ignored.

7. Calibrate the 4DCAPE-70T using the utility by following the on-screen instructions. If the utility is closed, it is available again under the System – Administration menu.

8. Complete – the Angstrom desktop should be displayed on the 4DCAPE-70T and is ready for use, else Android etc.

For support of the BBB and various distributions, please seek support from the respective websites associated with the BBB itself or the distributions.

A good place to start for information and support regarding the BBB and various distributions available is https://www.beagleboard.org

This website details the latest firmware images for the BBB: https://beagleboard.org/latest-images

This website details how to get started with the BBB: https://beagleboard.org/getting-started

For support regarding the 4DCAPE hardware itself, please go to the 4D Systems website and either contact Support directly via a Ticket or use the 4D Systems Forum.

3.3. Changing the brightness (Angstrom)

It is possible to change the backlight brightness as the backlight is PWM controlled.

Please note, these instructions may become obsolete as new versions of Debian are released, or if different distributions are used.

One method is to SSH into the Beaglebone Black from your PC and set the backlight value that way. Note this does not persist over restarts, so this would need to be entered into a start-up script if the setting is required to be set for each start-up.

At the command prompt, type the following:

```
$ sudo su
# cd /sys/class/backlight/backlight
# echo 100 > brightness
```

Where 100 represents 100%, this can be changed to any number from 0 to 100 as required.

The exact path may vary with distributions, so check the `/sys/class/backlight` path to see what backlight file exists.

3.4. Changing the brightness (Android)

Changing the brightness on Android is simple. Navigate to the Settings menu, to the Display option, and then to Brightness. Slide the slider to the desired position.

## 3.5. Calibrating resistive touch (Angstrom)

When a distribution is used for the first time with a 4DCAPE-70T, the default calibration application that comes with the Angstrom distribution is started automatically on the startup of Angstrom. If the calibration is however input incorrectly and it is required to be set again, a file must be deleted manually to then recalibrate the display.

For ones that do have the calibration program loaded by default, and if the calibration is input incorrectly and it is required to be set again, it can generally be started from the 'Start' menu.

One method is to SSH into the BBB using your PC, navigate to the following folder and delete the specified file. Another is to connect a USB Mouse to navigate around using the 4DCAPE-70T and delete the file that way.

```
/etc/pointercal.xinput
```

Once this file has been deleted, the calibration utility can be run again.
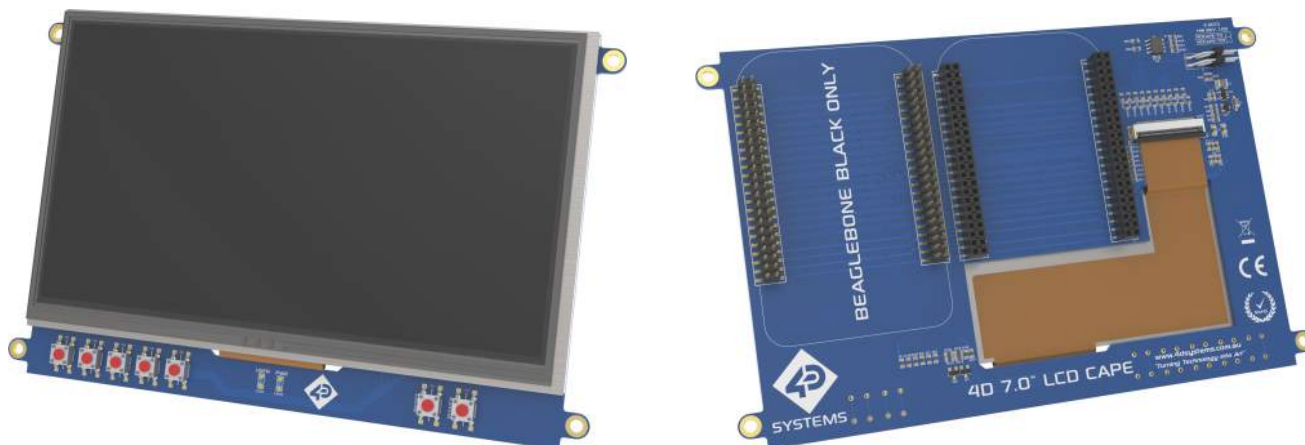
> ✏️ **Note**
>
> This may change as newer distributions become available, or if different distributions are used, so these instructions may become obsolete or inaccurate.

3.6. Android Information

The 4DCAPE is compatible with Android 4.2.2 and has been tested with an image from TI.

It has been noticed however that the EEPROM Jumpers both need to be connected/closed otherwise the 4DCAPE may not be detected by the Android OS.

3.7. Secondary Headers

The 4DCAPE features secondary headers (P2_A and P2_B) for another cape to be attached. Please refer to the schematic diagram section to see which pins/IO are from the BBB feature on the secondary headers.

It is up to the user to determine which capes are compatible based on which I/O is available.

4. EEPROM Details

On the 4D 7.0", LCD CAPE there is an EEPROM which is used to configure the Beagle Bone Black with the appropriate configuration to use the Cape.

· **4DCAPE-70T EEPROM**

EEPROM Support: YES

Board Name: 4D 7.0 LCD CAPE - 4DCAPE-70T

Manufacturer: 4D Systems

> ✏️ **Note**
>
> · Some EEPROM content refers to the LCD7 *which is made by CircuitCo*. This is the case due to how the BBB identifies the CAPE and what drivers to apply to it. Since the 4DCAPE-70T uses the LCD7 drivers, this must be the case.
>
> · The Beaglebone, Beaglebone Black and Beagleboard remain the property of beagleboard.org. All references to the words Beaglebone, Beaglebone Black, and Beagleboard are licensed under a Creative Commons Attribution-Share Alike 3.0 license.
>
> · All references to CircuitCo and LCD7 remain the property of CircuitCo and beagleboardtoys.org and are not affiliated with 4D Systems in any way.

5. Display Precautions

- Avoid having to display the same image/object on the screen for lengthy periods. This will cause a burn-in which is a common problem with all types of display technologies. Blank the screen after a while or dim it very low by adjusting the contrast. Better still, implement a screen saver feature.

- Moisture and water can damage the display. Moisture on the surface of a powered display will cause the electrodes to corrode. Wipe off any moisture gently or let the display dry before usage.

- Dirt from fingerprint oil and fat can easily stain the surface of the display. Gently wipe off any stains with a soft lint-free cloth.

- The performance of the display will degrade under high temperatures and humidity. Avoid such conditions when storing.

- Do not tamper with the display flex cable that is connected to the control board. This may affect the connection between the display and the driving circuitry and cause failure. Under no circumstances should the display flex be disconnected from the PCB and power applied to the PCB, as this could result in the instant failure of the CAPE.

- Displays are susceptible to mechanical shock and any force exerted on the module may result in deformed zebra stripes, a cracked display cell and a broken backlight.

- Always use the mounting holes on the module to mount the display.

- Remove the BBB from the 4DCAPE carefully when required to remove the BBB, as the headers on the 4DCAPE are SMT and excessive force or rough removal could break solder joints and connections. Carefully wiggle the BBB off the 4DCAPE if you require to remove the BBB from the cape once installed.

6. Software / Driver Disclaimer

4D Systems has developed this 4DCAPE for the Beaglebone Black. 4D Systems does NOT support any software associated with the BBB itself, as 4D Systems is not involved with the development or support of the BBB Operating Systems. It is up to the user to determine which distributions are used on the BBB, and therefore which are compatible with this CAPE. 4D Systems will supply the source code for the 4DCAPE, which is installed on the Debian Distribution for the BBB by default, however, the source can be used if Users wish to use another operating system. It will however be up to the User to get this operational. Assistance can be provided on our Forum

4D Systems has been made aware that there may be touch-related issues with the Angstrom Distribution (Possibly others based on the same issue source) of Linux, and the mouse may appear to 'self-touch' or jump around the screen on touch, or generally behave erratically. Since 4D Systems has not developed nor supported anything to do with the software associated with this hardware, 4D Systems is unable to assist or offer support regarding this matter. **A Fixed Kernel is now available, 3.8.13-bone37 while solving this issue** This Kernel is available via the Debian download which is linked on our Product Page. This issue was fixed in 2013, so all current distributions should already contain this fix - however, this is not guaranteed.
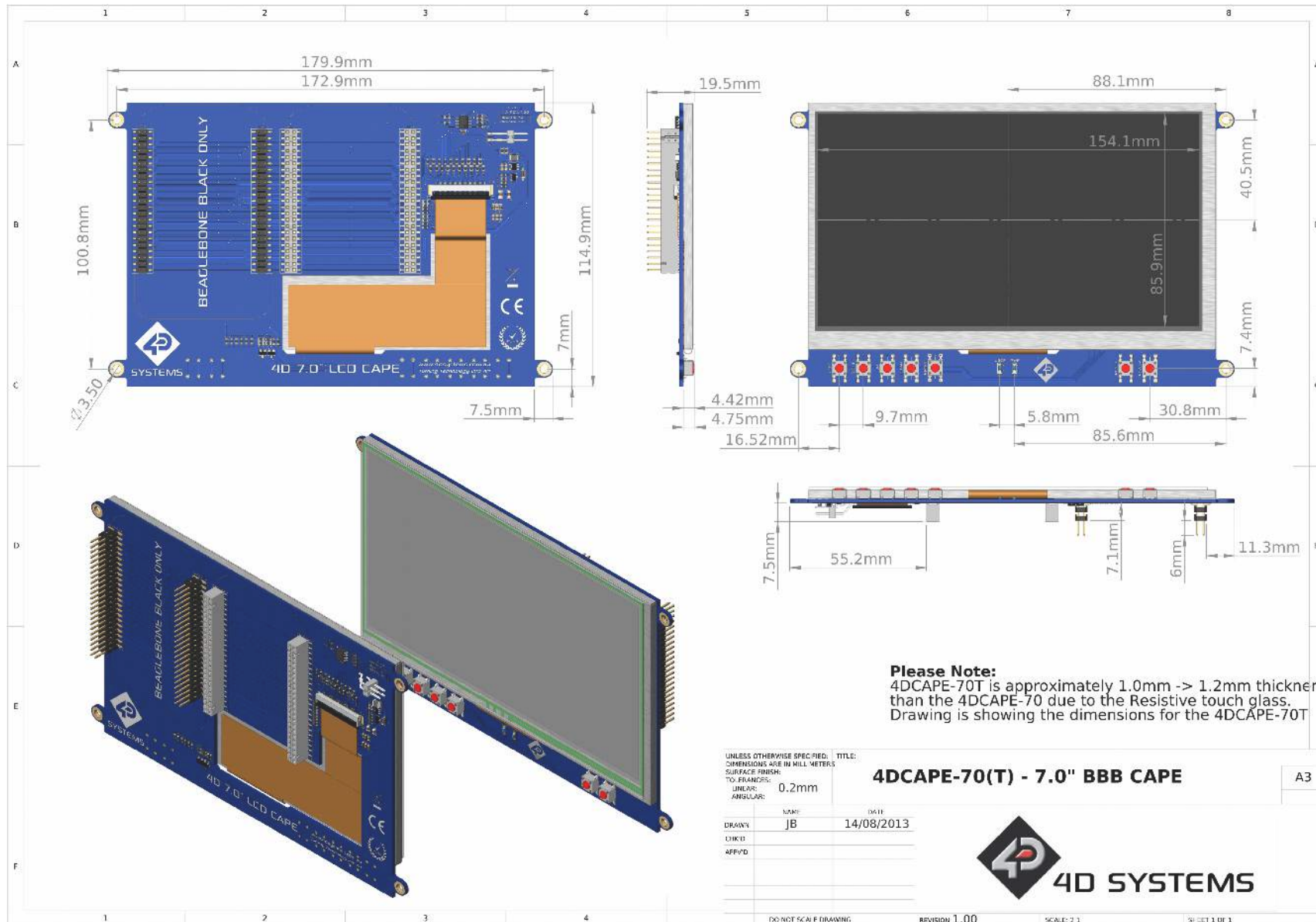
The Android distribution listed in this document does not feature this erratic touch behaviour and effectively illustrates the issues are software or driver related, and not hardware.

If these issues are encountered, it is encouraged to try the Android distribution to verify it is not a hardware issue. If the issue remains, please contact 4D Systems Technical Support. If the issue is no longer present and the touch works correctly on Android, then please contact the beagleboard.org community.
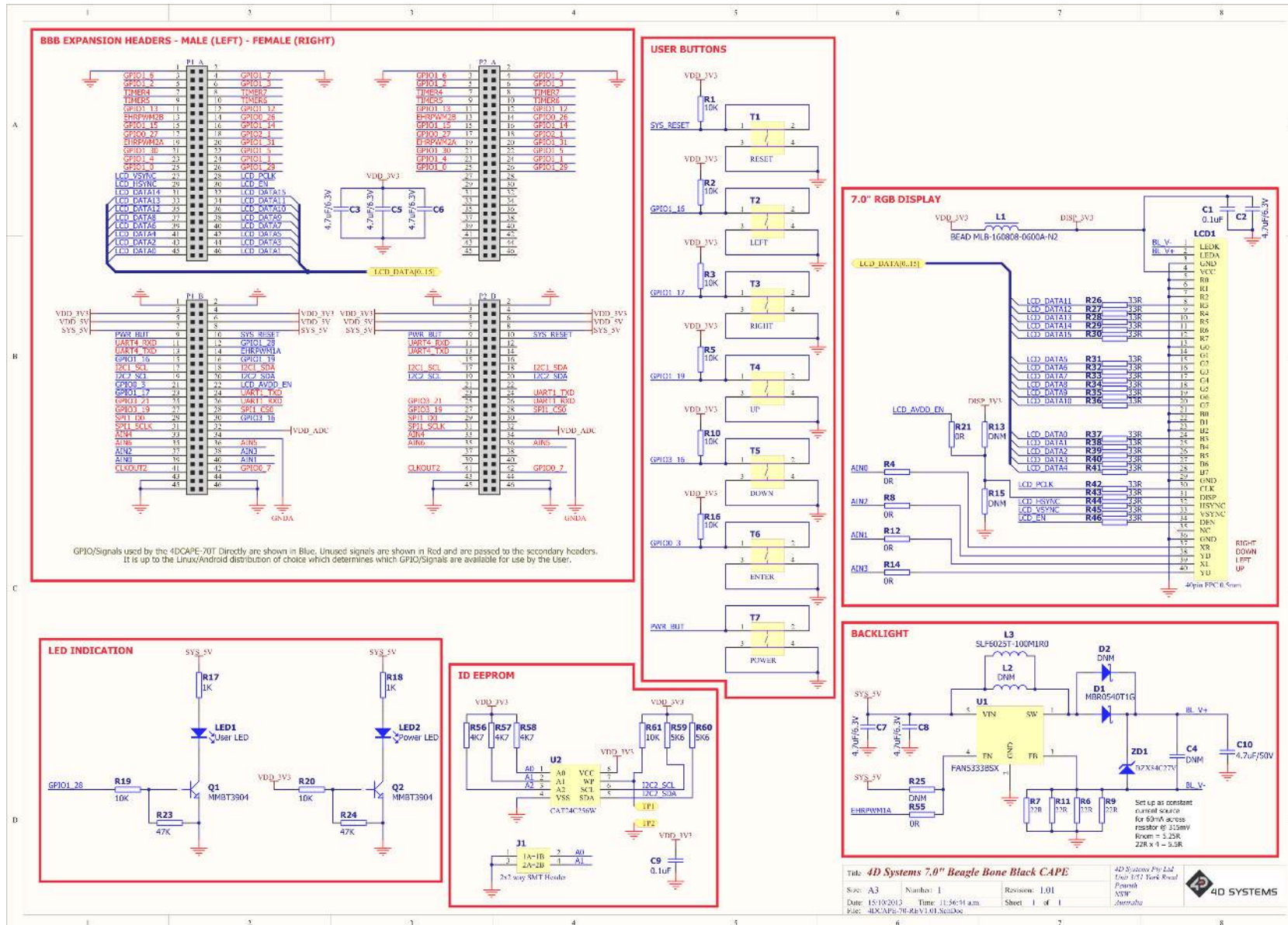
The 4DCAPE-43T uses drivers which have been written for other devices on the market and the hardware is set up similarly. Drivers for the Circuitco LCD4 are used for this CAPE and therefore if fixes are made to improve compatibility with the LCD4, they should also function correctly for the 4DCAPE-43T.

4D Systems is not responsible for issues regarding software or drivers associated with the BBB and the compatibility with this product. Community Software support is available via resources at www.beagleboard.org/collaborate.
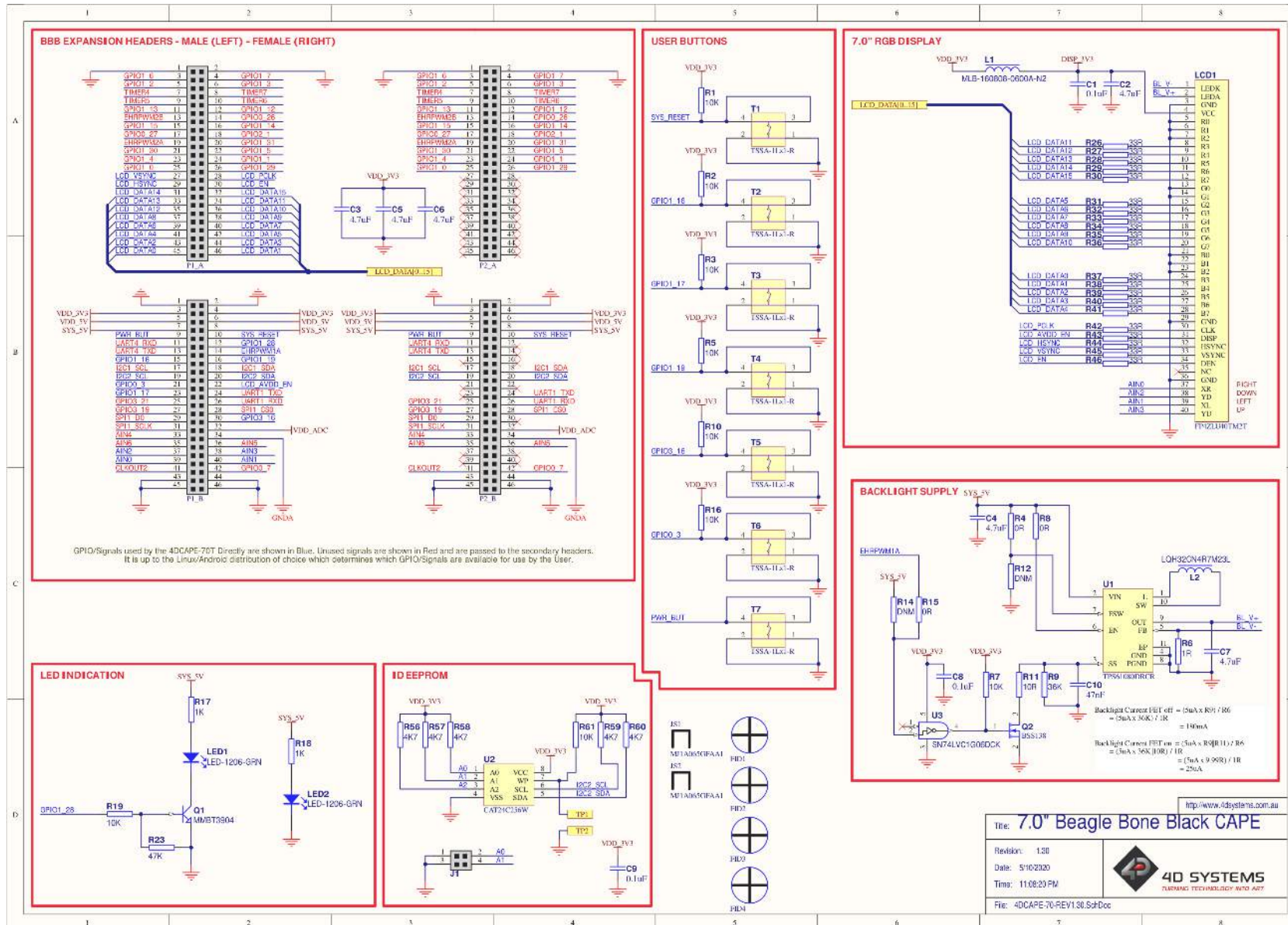
7. Mechanical Details

Please Note:
4DCAPE-70T is approximately 1.0mm -> 1.2mm thicker than the 4DCAPE-70 due to the Resistive touch glass. Drawing is showing the dimensions for the 4DCAPE-70T

TITLE: 4DCAPE-70(T) - 7.0" BBB CAPE

8. Schematic Diagram – HW REV 1.01

9. Schematic Diagram – HW REV 1.30

10. Ordering Information

☐ ORDERING INFORMATION
Order Code:
4DCAPE-70T
Packaging: Module sealed in antistatic foam padded 4D Systems Box

11. Revision History

☐ Datasheet Revision		
Revision	**Date**	**Description**
1.3	30/01/2023	Modified for web-based documentation
1.4	02/08/2023	Updated Beaglebone/Beagleboard URLs