

# **LCD8000-97C**

**9.7" LVDS LCD Display Module**

**By**

**element14**



**User Manual**

**Version 1.2**

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**Revision History:**

<b>Version</b>	<b>Date</b>	<b>Description</b>
1.0	10/12/2013	Original Version
1.1	20/05/2014	Minor Update
1.2	30/06/2014	Added RIoTboard support

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# 1 Product Overview

The LCD8000-97C is a 9.7" capacitive multi-touch\* LCD module developed by element14 for use with the MarS Board - a super ARM DIY platform, and SABRE Lite. The LCD8000-97C has an LVDS interface and supports a resolution of up to 1024x768 and 260,000 colours. Its multi-touch screen brings an enhanced experience to the users of the MarS Board and the SABRE Lite.

## 1.1 Packing List

- ✓ LCD8000-97C
- ✓ Mini HDMI C-to-C Cable (for RIoTboard & Mars Board)
- ✓ LVDS Cable (for SABRE Lite)

*\* Multi-touch is available only while using an Android operating system, Linux Operating Systems will only allow single touch.*

## 2 Hardware Features

- 9.7" TFT Screen
- Resolution of 1024x768, 260,000 colours
- Supports LVDS Signals
- Multi-Touch Capacitive Touch-Screen

### 2.1 Operational Parameters

- Operating Ambient Temperature: 0°C ~ +50°C
- Storage Temperature: -25°C ~ +65°C
- Operating Humidity: 20% - 90%
- Dimension: 239mm x 185mm
- Power Supply: +5V (provided by MarS Board or SABRE Lite)

## 3 Using LCD8000-97C on RIoTboard

This section details the hardware and software required and the procedure that must be undertaken to use the LCD8000-97C with the RIoTboard.

### 3.1 Requirements

- RIoTboard
- LCD8000-97C
- UART8000-U
- 5V PSU
- Mini HDMI C to C cable (included with the LCD8000-97C)
- Latest Android or Linux Image from:



[www.element14.com/riotboard](http://www.element14.com/riotboard)

### 3.2 Hardware Connections

1. Use the LVDS cable provided with the product to connect the Mini HDMI interface on LCD8000-97C to the LVDS interface on the RIoTboard as shown below



**Figure 1** Connections between RIoTboard and LCD8000-97C

2. Connect the red, green and black wires of UART8000-U to the corresponding pins of the J18 connector on the RIoTboard as illustrated in the following figure

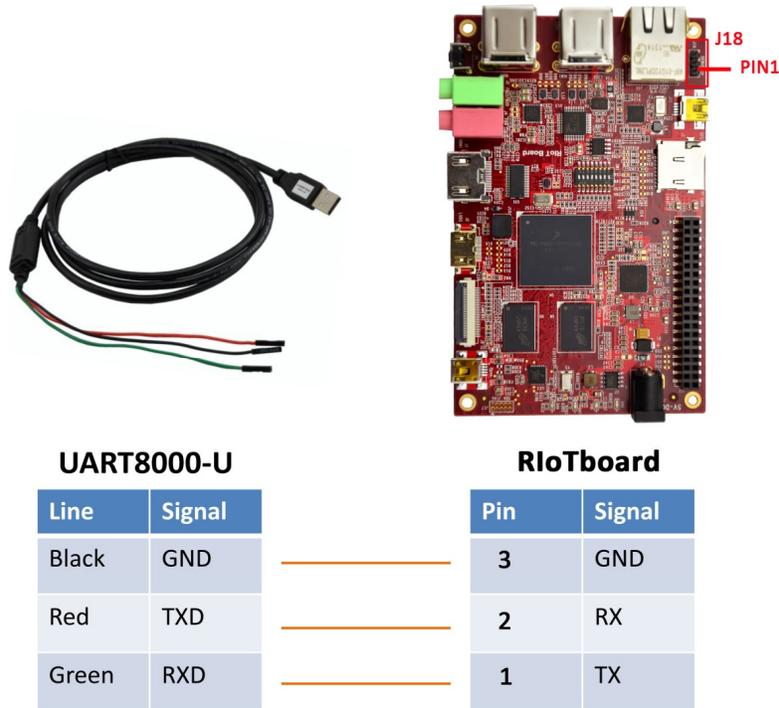


Figure 2 Diagram for Connection of RIoTboard and UART8000-U Hardware

3. Connect the 5V power adaptor to the development board, the complete hardware connection can be seen below:

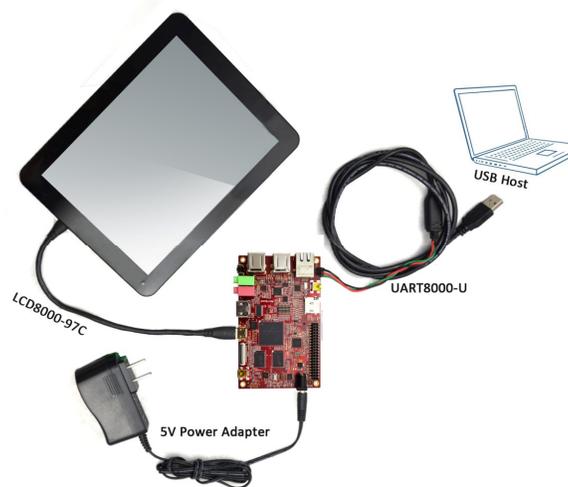


Figure 3 Complete hardware connection

### 3.3 Software Configuration

1. The latest images and source code for Linux and Android on RIoTboard have been updated to provide support for the LCD8000-97C. They are available from:



<http://www.element14.com/riotboard>

2. Please refer to the RIoTboard User Manual for more information on updating the Android/Linux images on the RIoTboard.
3. After the update process is complete, please reboot the RIoTboard, when you see "Hit any key to stop autoboot" in your terminal window press any key on PC's keyboard to enter u-boot.

```
U-Boot 2009.08-dirty (Oct 17 2013 - 17:08:06)

CPU: Freescale i.MX6 family T01.1 at 792 MHz
Thermal sensor with ratio = 201
Temperature: 42 C, calibration data 0x5f55765f
mx6q pll1: 792MHz
mx6q pll2: 528MHz
mx6q pll3: 480MHz
mx6q pll8: 50MHz
ipg clock      : 66000000Hz
ipg per clock : 66000000Hz
uart clock    : 80000000Hz
cspi clock    : 60000000Hz
ahb clock     : 132000000Hz
axi clock     : 198000000Hz
emi_slow clock: 99000000Hz
ddr clock     : 396000000Hz
usdhc1 clock  : 198000000Hz
usdhc2 clock  : 198000000Hz
usdhc3 clock  : 198000000Hz
usdhc4 clock  : 198000000Hz
nfc clock     : 24000000Hz
Board: i.MX6DL/Solo-SABRESDB: unknown-board Board: 0x61011 [POR ]
Boot Device: MMC
I2C:  ready
DRAM:  1 GB
```

```
MMC:   FSL_USDHC: 0,FSL_USDHC: 1,FSL_USDHC: 2,FSL_USDHC: 3
In:    serial
Out:   serial
Err:   serial
Net:   got MAC address from IIM: 00:00:00:00:00:00
----enet_board_init: phy reset
FEC0 [PRIME]
Hit any key to stop autoboot:  0 (Hit any key to enter U-boot)
MX6Solo RIoTboard U-Boot >
```

4. Execute the following instructions to set the correct display mode for the LCD8000-97C:

```
 MX6Solo RIoTboard U-Boot > setenv bootargs console=ttymxc1,115200
init=/init nosmp video=mxcfb0:dev=ldb,bpp=32 video=mxcfb1:off fbmem=10M
vmalloc=400M androidboot.console=ttymxc1 androidboot.hardware=freescale
 MX6Solo RIoTboard U-Boot > saveenv
```

**Note:**

 Currently the LCD8000-97C only supports single touch input when used with a Linux environment.

5. Reboot the RIoTboard again and the system will now function correctly.

## 4 Using LCD8000-97C with SABRE Lite

This section details the hardware and software required and the procedure that must be undertaken to use the LCD8000-97C with the SABRE Lite.

### 4.1 Requirements

- SABRE Lite
- LCD8000-97C
- Serial Cable (included with the SABRE Lite)
- 5V PSU (included with the SABRE Lite)
- LVDS Cable (included with the LCD8000-97C)
- Latest Android or Linux Image from:



[www.element14.com/imx6](http://www.element14.com/imx6)

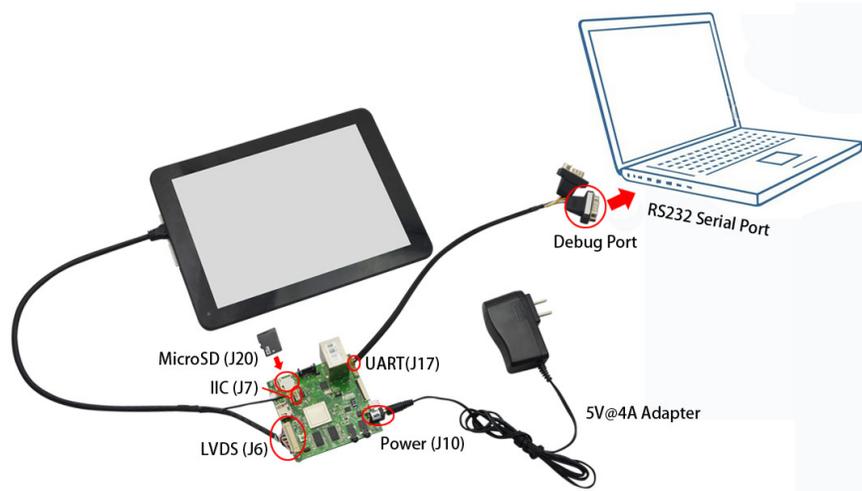
### 4.2 Hardware Connections

1. Use the LVDS cable provided with the product to connect the Mini HDMI interface on the LCD8000-97C to the LVDS and I<sup>2</sup>C interfaces on the SABRE Lite as shown below:



**Figure 4** Connections between SABRE Lite and LCD8000-97C

2. Use the serial cable provided with the SABRE Lite to connect the serial interface on the device to your PC. Now insert the TF card loaded with Linux or Android image into the SABRE Lite micro-SD card slot and connect a 5V/4A power supply to finish the hardware connection as shown below:



**Figure 5** Complete hardware connection

## 4.3 Software Configuration

1. The latest images and source code for Linux and Android on the SABRE Lite have been updated to provide support for the LCD8000-97C. They are available from:



[www.element14.com/iMX6](http://www.element14.com/iMX6)

2. Please refer to the Sabre Lite User Manual and Quick Start Guide for more information on how to update the Android/Linux images on the board.
3. After updating is done, please reboot the SABRE Lite and press any key on PC's keyboard to enter u-boot when you see "Hit any key to stop autoboot" in your terminal window:

```

U-Boot 2009.08 (Nov 13 2013 - 11:06:28)

CPU: Freescale i.MX6 family T01.2 at 792 MHz
Temperature: 42 C, calibration data 0x5764fd69
mx6q pll1: 792MHz
mx6q pll2: 528MHz
mx6q pll3: 480MHz
mx6q pll8: 50MHz
ipg clock      : 66000000Hz
ipg per clock : 66000000Hz
uart clock    : 80000000Hz
cspi clock    : 60000000Hz
ahb clock     : 132000000Hz
axi clock     : 264000000Hz
emi_slow clock: 132000000Hz
ddr clock     : 528000000Hz
usdhc1 clock  : 198000000Hz
usdhc2 clock  : 198000000Hz
usdhc3 clock  : 198000000Hz
usdhc4 clock  : 198000000Hz
nfc clock     : 24000000Hz
Board: MX6Q-SABRELITE:[ POR]
Boot Device: I2C
I2C:  ready
DRAM:  1 GB
MMC:   FSL_USDHC: 0,FSL_USDHC: 1
JEDEC ID: 0xbf:0x25:0x41
Reading SPI NOR flash 0xc0000 [0x2000 bytes] -> ram 0x276009b8
SUCCESS

*** Warning - bad CRC, using default environment

In:    serial
Out:   serial
Err:   serial
Net:   got MAC address from IIM: 00:00:00:00:00:00
FEC0 [PRIME]
Hit any key to stop autoboot:  0  (press any key to enter uboot)
MX6Q SABRELITE U-Boot >

```

4. Execute the following instructions to set the display mode for the 9.7" LVDS LCD:

```
setenv bootargs console=ttymxc1,115200 init=/init rw  
video=mxcfb0:dev=ldb, LDB-XGA,if=RGB666 fbmem=10M vmalloc=400M  
androidboot.console=ttymxc1  
saveenv
```

**Note:**

📖 At present, the touch screen of LCD8000-97C only supports single point touch on Linux based systems

5. Reboot the SABRE Lite again and the system will now function correctly.

# 5 Using LCD8000-97C with the MarS Board

This section details the hardware and software required and the procedure that must be undertaken to use the LCD8000-97C with the MarS Board.

## 5.1 Requirements

- MarS Board
- LCD8000-97C
- USB Mini B to A Cable
- 5V PSU
- Mini HDMI C to C cable (included with the LCD8000-97C)
- Latest Android or Linux Image from:



[www.element14.com/imx6](http://www.element14.com/imx6)

## 5.2 Hardware Connections

1. Use the Mini HDMI cable provided with the product to connect the LVDS interface on the MarS Board to the Mini HDMI interface on the LCD8000-97C as shown below:



**Figure 6** Connection between MarS Board and LCD8000-97C

2. Use a (Type Mini B Male to Type A Male) USB cable to connect the USB debugging interface on the MarS Board to a USB interface on your PC, and then connect a 5V power supply to the board to finish the hardware connections as shown below:

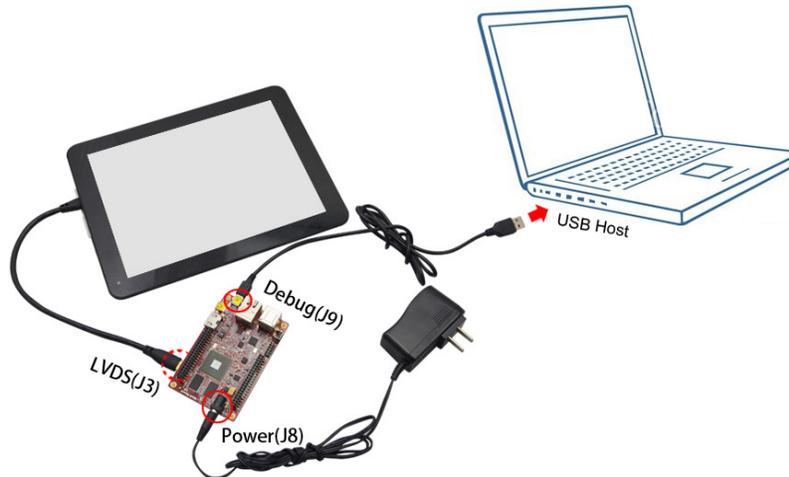


Figure 7 Complete hardware connection

## 5.3 Software Configuration

1. The latest images and source code for Linux and Android on the MarS Board have been updated to support the LCD8000-97C.
2. For download please visit: [www.element14.com/iMX6](http://www.element14.com/iMX6)
3. Please refer to the MarS Board User Manual for detailed instructions on how to update the Linux/Android images on the board.
4. After updating is done, please reboot the MarS Board and press any key on your PC's keyboard to enter u-boot when you see "Hit any key to stop autoboot" in your terminal window:

```

U-Boot 2009.08-svn1 (Mar 14 2013 - 14:07:49)

CPU: Freescale i.MX6 family T00.0 at 792 MHz
Temperature: 51 C, calibration data 0x58150469
mx6q pll1: 792MHz
mx6q pll2: 528MHz
mx6q pll3: 480MHz
mx6q pll8: 50MHz
ipg clock      : 66000000Hz
ipg per clock : 66000000Hz
uart clock     : 80000000Hz
cspi clock     : 60000000Hz
ahb clock      : 132000000Hz
axi clock      : 264000000Hz
emi_slow clock: 29333333Hz
ddr clock      : 528000000Hz
usdhc1 clock   : 198000000Hz
usdhc2 clock   : 198000000Hz
usdhc3 clock   : 198000000Hz
usdhc4 clock   : 198000000Hz
nfc clock      : 24000000Hz
Board: MX6Q-MARSBOARD:[ POR]
Boot Device: I2C
I2C:  ready
DRAM:  1 GB
MMC:   FSL_USDHC: 0,FSL_USDHC: 1
JEDEC ID: 0xbf:0x25:0x41
Reading SPI NOR flash 0xc0000 [0x2000 bytes] -> ram 0x276009b8
SUCCESS

*** Warning - bad CRC, using default environment

In:    serial
Out:   serial
Err:   serial
Net:   got MAC address from IIM: 00:00:00:00:00:00
----enet_board_init: phy reset
FEC0 [PRIME]
Hit any key to stop autoboot:  0 (press any key to enter uboot)
MX6Q MARSBOARD U-Boot >

```

5. Execute the following instructions to set the display mode for the 9.7-inch LVDS LCD;

```
 setenv bootargs console=ttymxc1,115200 init=/init rw  
video=mxcfb0:dev=ldb, LDB-XGA,if=RGB666 fbmem=10M vmalloc=400M  
androidboot.console=ttymxc1  
 saveenv
```

**Note:**

 At present, the touch screen of LCD8000-97C only supports single point touch on a Linux based system

6. Reboot the MarS Board again and the system will now function correctly.