

Quick Start Guide



ARQ3 Evaluation & Development System

- Secure, remote control & access over IP
- RealVNC Enterprise Edition Server in ASIC
- High performance KVM functionality
- Ideal for KVM switching and embedded server applications



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ARQ3 Evaluation & Development System Quick Start Guide.

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About this Guide

Welcome to the ARQ3 Evaluation & Development System (ARQ3-EDS). The system combines the ARQ3 KVM module with a general purpose Motherboard to facilitate evaluation of the ARQ3 module/ASIC capability and the development of advanced remote access KVM products.

This Quick Start Guide contains the following information:

- Introduction to the components of the kit
- Identification of additional resources
- Precautions to take while assembling and using the kit
- Hardware assembly, connection and configuration
- Software installation and configuration
- Simple introductory usage scenarios

There is also a list of references to aid the design-in process, and a troubleshooting guide.

Requirements

Development Kit Parts List

The ARQ3 Evaluation and Development System (ARQ3400-F484-EVAL-100) contains the following items:

- ARQ3 Module in anti-static bag
- ARQ3 Development Motherboard in anti-static bag
- External Plug-In Power Supply 5V, 2A
- USB 2.0 A/B cable.

Additional Requirements

Video Sources

The ARQ3-EDS can process video from DVI and SVGA sources. In order to use the digital or analog connection through the DVI connector the user will have to connect a suitable cable.

Host Terminal

Configuration and monitoring of the ARQ3-EDS is achieved through a serial data connection. Suitable data terminal equipment must be provided by the user (see *Serial Console* on page 21).

Network Connectivity

The ARQ3-EDS provides a full 10/100BaseT Ethernet port.

References

- [1] Adventiq DDC ROM programming utility
- [2] ARQ3 User Guide

Precautions

ESD

The ARQ3 Evaluation & Development System is designed and produced using methods and components appropriate for application in office and consumer environments. However, to aid detailed evaluation, the system is not enclosed, leaving the components on the PCBs more vulnerable to static electricity.

ElectroStatic Discharge (ESD) can permanently damage your system. The ARQ3 Evaluation & Development System should only be used in an Electrostatic Protective Area (EPA).

Precautions to prevent ESD must be followed at all times, including storage¹:

- Minimize handling of PCBs
- Use antistatic strap whilst handling
- Unless unavoidable, only handle by PCB edges.

Environmental and Mechanical

The ARQ3 ASSP and module are designed with commercial applications in mind. The ARQ3-EDS should however only be considered for use in a normal electronics development laboratory environment and not exposed to extreme environmental or mechanical conditions.

1. A source of information on ESD can be found at <http://www.esda.org>

Installation

Software Installation

The ARQ3 Evaluation & Development System comes already configured with a dedicated Linux server system. No further software installation is needed.

Hardware Assembly

The ARQ3 Module and Development PCBs are usually supplied connected together. If this is the case, you can ignore this section and proceed straight to *Hardware Configuration* on page 9.

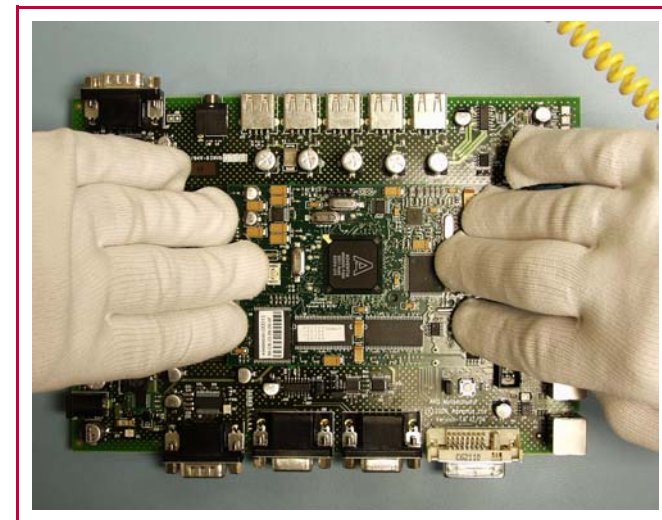
Caution: Work in an electrostatic protective area and use antistatic strap.

Three connectors provide the link between the PCBs. The installation requires some care but is quite simple:

- 1 Remove ARQ3 Module PCB and Development Motherboard PCB from their antistatic bags.
- 2 If required, attach plastic feet to ARQ3 Development Motherboard. These should be attached at each corner of the underside of the PCB, and under each of the three interboard connectors.
- 3 Gently place the Module board into the correct position.
The three interboard connectors are easily identified. There is only one possible orientation; correct alignment is unmistakable but must be done carefully.
- 4 Check the position of the two low-profile socket/headers; with these properly aligned, the third (high speed) connector will also be aligned.
- 5 Ensure the Motherboard is firmly supported. To make the connection, apply progressive pressure to the Module board directly above the two low profile connectors.

If doing this by hand:

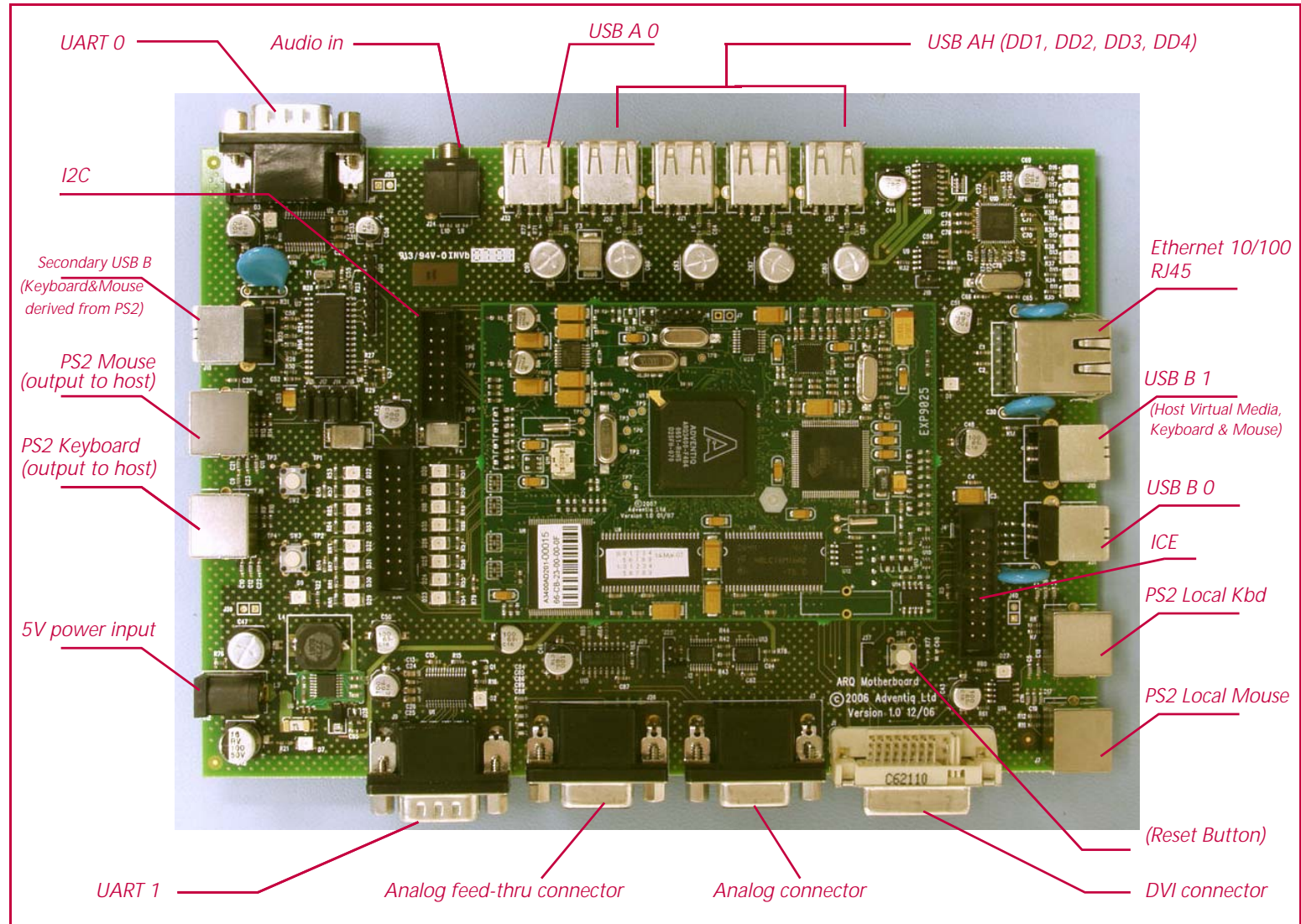
- Connect one end at a time, starting with the end that has the high speed connector, as this helps ensure the correct board alignment
- When applying pressure above connectors, use as many fingers as possible¹



- Inspect the low-profile connectors to ensure the boards are correctly joined.
- 6 If required, you can improve the mechanical security of the physical connection between ARQ3 module board and the host board: Fit a 5mm spacer/stand-off between the fixing holes provided in the two boards and secure using a suitable screw and nut set.

1. *Touching the components is unavoidable, but ESD precautions must still be taken.*

External Connectors



DVI and Analog Connectors

Video data can be provided from the host computer on either of the DVI or Analog connectors. For analog video a suitable cable is provided with the ARQ3-EDS.

Analog feed-thru Connector

An optional video connection to a local analog screen can be made using the feed-thru connector.

Ethernet

A RJ45 10/100 Ethernet Socket is provided for network access. The configuration of the Ethernet system is described in *IP Address* on page 15.

UARTs

UART0 is initially configured as a serial terminal host, providing a basic command line interface to the ARQ3 Linux System. The configuration of the port:

- 38400 Baud
- 1 Stop bit
- No Parity
- No flow control

The ARQ3 Linux System has this configured to `/dev/ttyS0`.

If connecting to another host computer a serial null modem cable is required.

UART1 is unconfigured.

Connection to these UART ports is optional.

USB 0/1

The USB port 1 provides a device only port. The port is configured to provide USB keyboard, mouse and virtual media support to a host.

The USB port 0 can be configured as a host or device. Some hardware configuration is required, see *J29 pin 1 linked to J36 pin 1 (Motherboard GPIO8)* on page 11.

Connection to these ports is optional.

Local PS2

PS2 connectivity for local keyboard and mouse is provided. Standard devices can be used. Connection to these ports is optional.

Host PS2

PS2 connectivity to provide keyboard and mouse input to the host computer. PS2 thru cables are required. For any useful operation of the evaluation system these or the USB Keyboard port must be connected to the corresponding host computer port(s).

Secondary USB Keyboard

The ARQ3 Host PS2 can be translated in to a USB format. To configure this option see *Host Keyboard & Mouse* on page 9.

Audio

Audio support will be added in the near future.

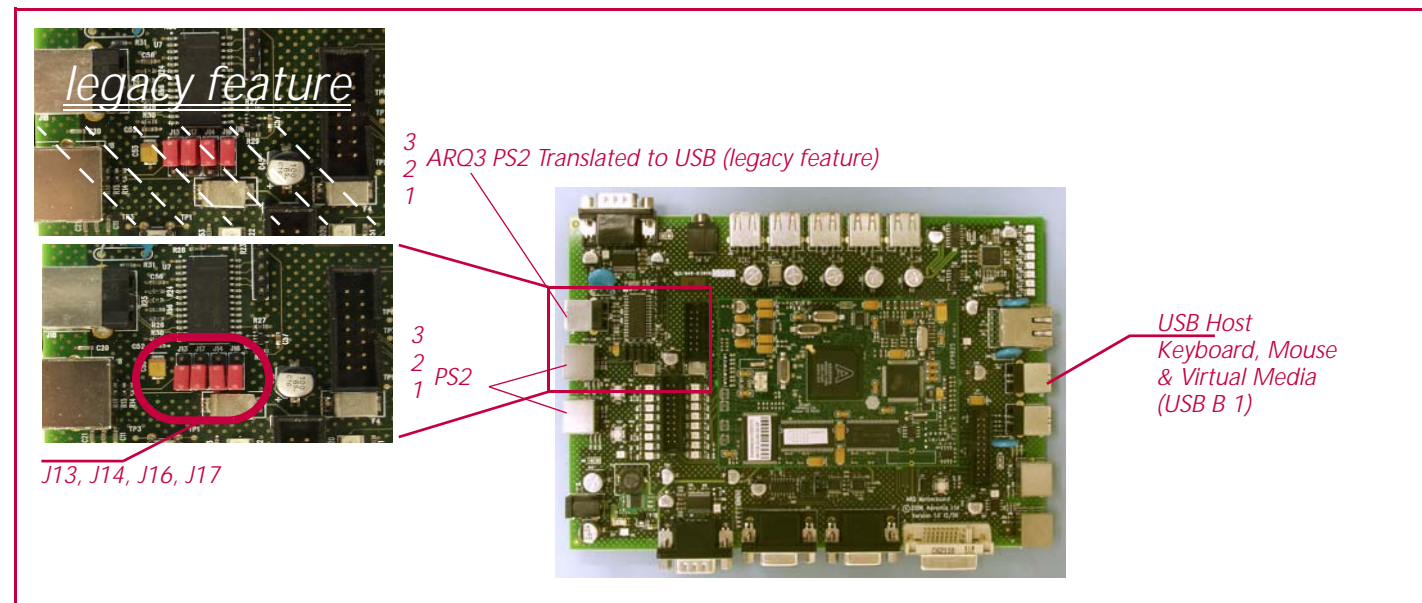
ICE

ARM-ICE port. For further details contact Adventiq.

Hardware Configuration

Host Keyboard & Mouse

Host keyboard and mouse connectivity is provided via PS2 and USB connections. In the figure below, the PS2 connectors are found on the left and the USB connector on the right.



The identified USB connector (USB B 1) provides virtual media connectivity as well as for the host keyboard and mouse. The virtual media function works simultaneously with the keyboard and mouse features.

The host PS2 keyboard and mouse connectivity is configured by linking pins 1 & 2 for all jumpers (J13, J14, J16 and J17). These jumpers must be configured exactly the same.

Prior to firmware version 1.0b3 the host USB keyboard and mouse connectivity was only supported via the PS2 Host Interface: link pins 2

& 3 for all jumpers. This feature remains available, but is no longer recommended.

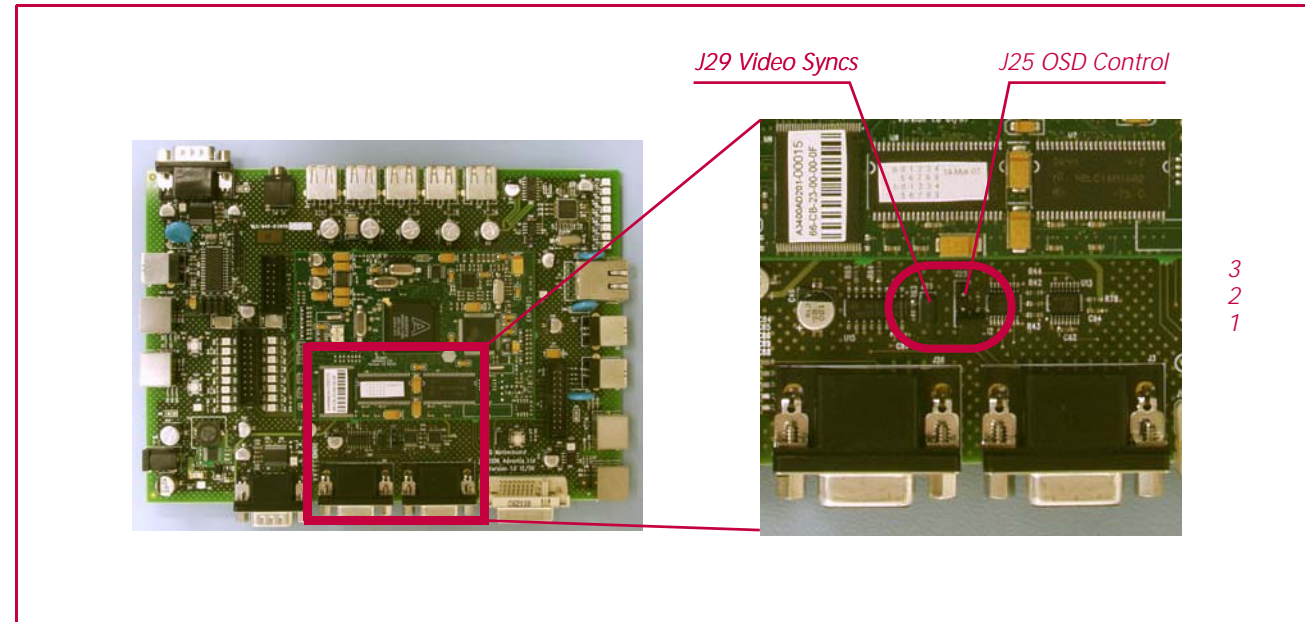
Wherever possible, before connecting to host computer PS2 interfaces: ensure that power is disconnected from the ARQ3-EDS and the host computer to be connected; power on the ARQ3-EDS before the host.

Note: If it is not possible to switch off devices prior to connection, then a 'Hot plug' procedure is available. See *Keyboard and Mouse Hot Plug* on page 21 for more details.

Analog Video Display

Analog video can be routed from the Analog Connector to the Analog feed-thru Connector. OSD data can be overlaid on the Analog feed-thru.

The mode of the Analog feed-thru is selected with J25 and J29.



OSD Control J25 (pin order shown to right in figure):

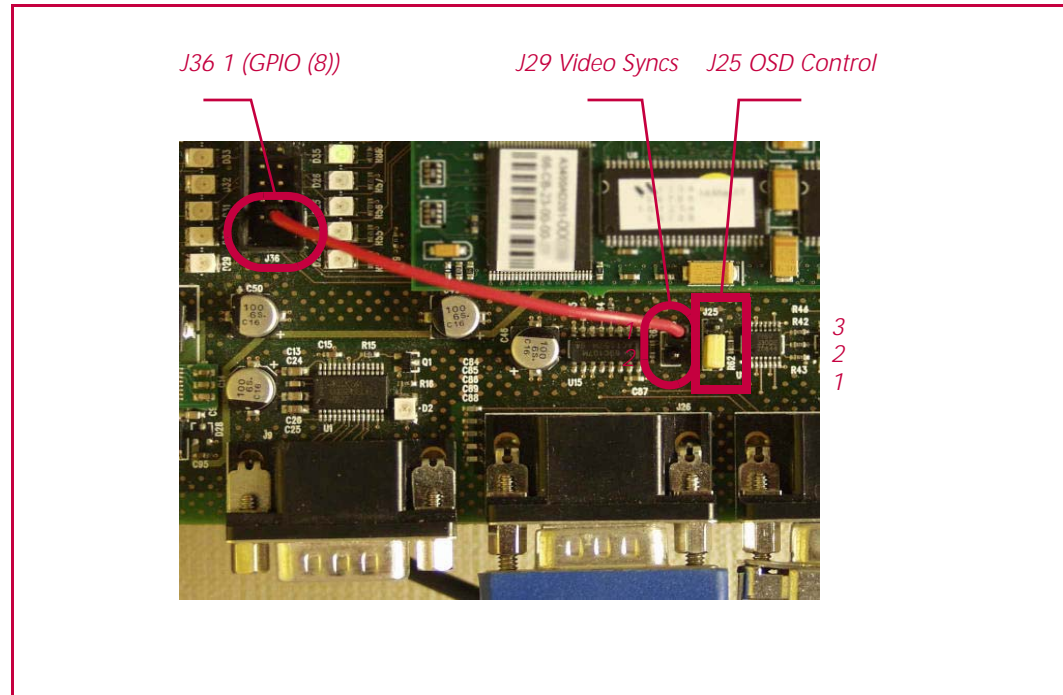
- No link – OSD only
- 1-2 linked – OSD overlay
- 2-3 linked – direct Analog feed-thru

Video Syncs J29:

- No link – hsync and vsync from Analog Connector.
- Linked – hsync and vsync generated by OSD subsystem

OSD Overlay

The OSD can be configured to overlay on the source video. This is achieved for ARQ3 Evaluation & Development System by:



- J25 pins 1-2 linked
- J29 pin 1 linked to J36 pin 1 (Motherboard GPIO8)

USB Configuration

The ARQ3 has two USB ports.

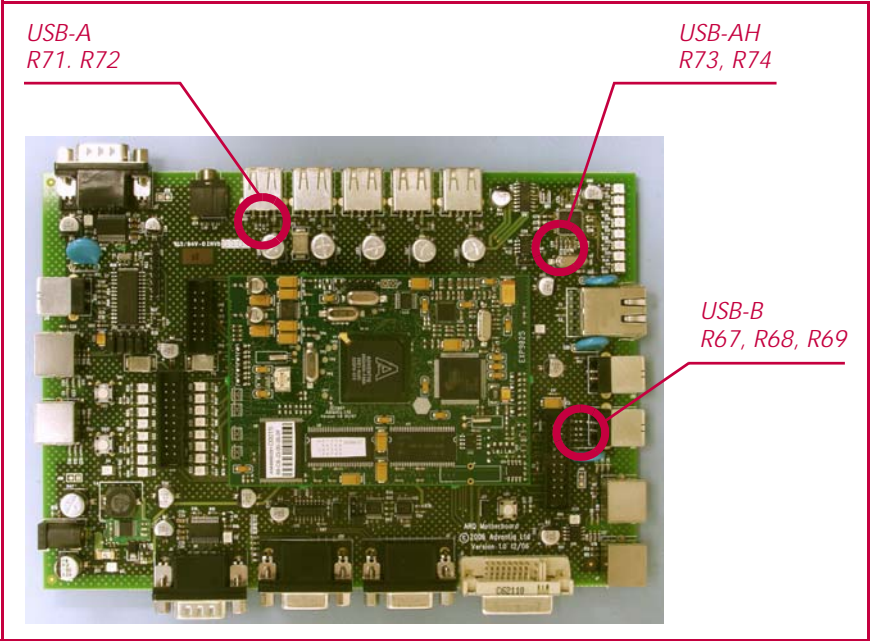
Port 0 can provide USB OTG functionality. The Motherboard can be configured to use this port as either a host or a device. A USB hub is provided on the Motherboard for this port 0 to be connected to if desired.

This hardware configuration is achieved using 0603 0 Ohm solder links. The links that need to be closed are outlined in the table below.

Only one configuration is possible at any time.

Configurations	Connector	links to close
USB device	J31 USB-B 0	R67 R68 R69
USB host	J32 USB-A 0	R71 R72
USB hub	J20-J23 USB-AH	R73 R74

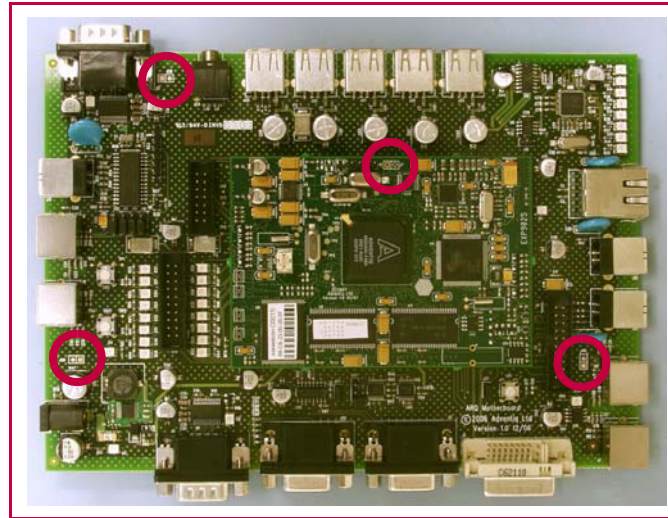
The software configuration must be appropriately set.



Port 1 provides device capabilities only and has no special configuration.

Gnd

Ground points are provided on the Module and the Motherboard.
There are other ground points, but the ones listed are the most convenient.



- Motherboard at J38, J39 and J40
- Module at J7

Power-up

Simply connect the provided 5V supply, in the off state, to the connector and turn on.

Server Software

The VNC Server software is preconfigured. There is limited work required to start the system.

IP Address

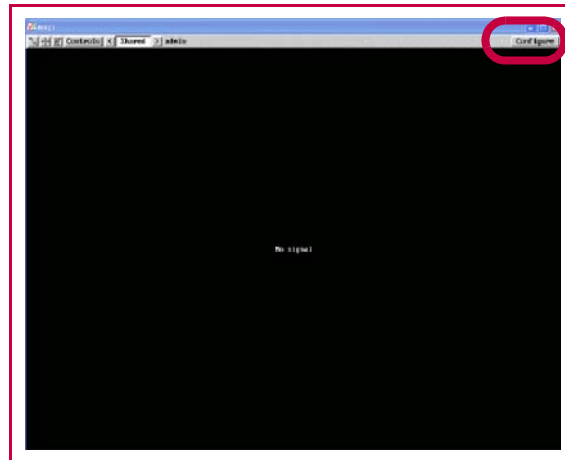
The ARQ3 Evaluation & Development System is produced with a default IP address: 192.168.16.254.

The address will most likely need changing to another value.

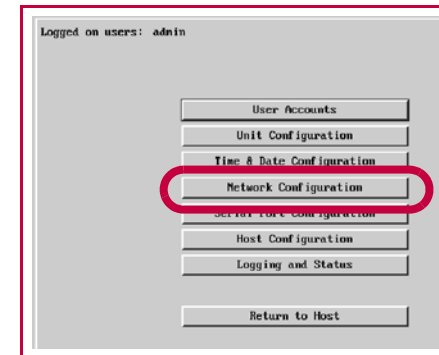
Configure with VNC Server

The easiest method of configuring the server software is to bring the system up on a standalone network which can accept the default IP address. Then:

- Connect with VNC client.
- Click **Configure** on the top right of the window.



- Click **Network Configuration**.



- Modify fields as required.
- Save the new values.

The VNC Server will be reconfigured and will then disconnect from the current VNC Client.

Configuring via the OSD

Under normal operation the On-Screen Display is not visible. However, if the local keyboard HotKey (the default HotKey is Ctrl+Alt+C) is entered or if the unit detects that its configuration has been corrupted, the on-screen display will become visible through the local video port, and can be controlled using the locally connected keyboard.

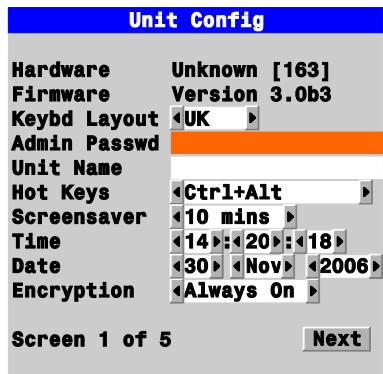
The OSD will take you through a set up sequence consisting of four main screens, each described here.

Controlling the local configuration menus

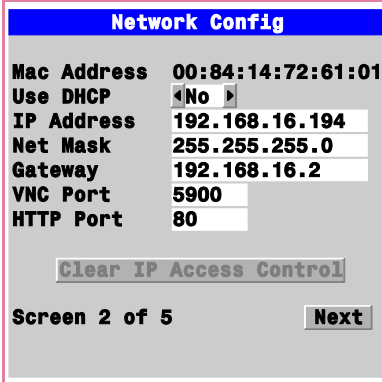
The local menus use only the keyboard. Use the keyboard arrow keys to move the green highlight indicator to the required position. Then, either type the required information or use the left and right arrows to change multiple choice items, as appropriate.

To perform the initial local configuration:

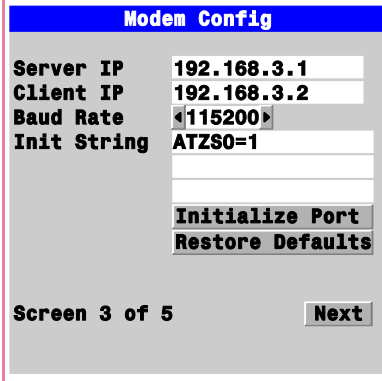
- 1 Edit the Unit Config screen to configure basic setup details such as the keyboard layout, admin password, time and date. When all items are correct, select **Next** to display the next screen.

Unit Config screen	Parameter	Description
	Admin password	Enter a password of at least six characters that has a mix of letters and numerals. The background color provides an indication of password suitability and is initially red to indicate that the password is not sufficient. When a password with reasonable strength has been entered it changes to blue.
	Time and Date	Set these correctly as all entries in the activity log are time stamped using them.
	Encryption	Arrange this setting according to your security requirements. See Encryption settings in [2] for a description of the issues and the settings.

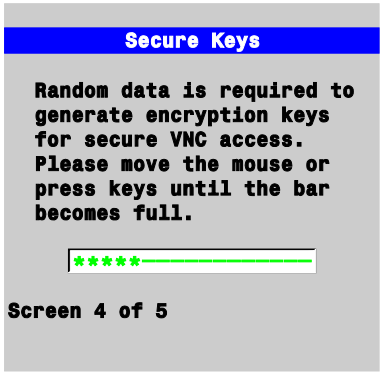
- Use the Network Config screen to configure the various key aspects of the IP network port addressing. When all items are correct, select **Next** to display the next screen

Network Config screen	Parameter	Description
	<p>Use DHCP/IP address/Net Mask/Gateway</p> <p>VNC and HTTP ports</p>	<p>You need to either set the DHCP option to 'Yes' or manually enter a valid IP address, Net mask and Gateway. See Networking issues in [2] for more details.</p> <p>These should remain set to 5900 and 80, respectively, unless they clash with an existing setup within the network. See Networking issues in [2] for more details.</p>


- If necessary, edit the Modem Config screen. When all items are correct, select **Next** to display the next screen.

Modem Config screen		Description
		<p>Allows you to optionally alter the current settings for the serial port that is used to connect a modem or ISDN terminal adapter. The IP addresses are used to emulate a two-port network connection and are suitable for most situations.</p> <p>The default items here are perfectly adequate for the majority of modem and ISDN terminal adapter installations.</p> <p>The Server IP and Client IP addresses are used to form an isolated two-device PPP network connection via the dial up link. Their settings are not related to any other 'real' network settings within the ARQ3-EDS.</p>

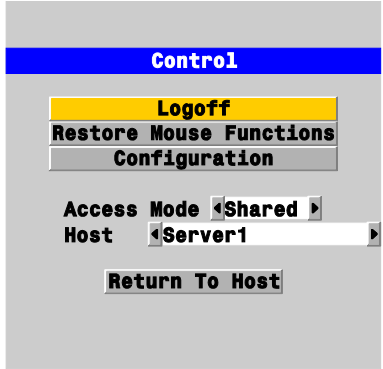
- 4 Use the Secure Keys screen to generate encryption keys.

Secure Keys screen		Description
		<p>This screen uses your mouse movements or keyboard inputs to create random data. This unpredictable information is then combined with several other factors to develop the basis of the encryption keys that are used to establish secure remote links.</p> <p>With every mouse move and keypress the single dash will move across the screen (unless the same key is pressed repeatedly). Periodically, a new star character will be added to the bar as the random data are accepted as part of the new encryption key. When the bar is full, the final encryption keys for your ARQ3-EDS will be created – this process takes roughly 30 to 40 seconds.</p>

- 5 Once the secure keys have been calculated the ARQ3-EDS will restart and present a standard logon screen.

Logon screen		Description
		<p>At this stage the username will be 'admin' and the password will be whatever you entered in the first setup screen.</p> <p>Once the username and password have been accepted, the screen should now show the host computer screen (or, if none is connected, a blank image).</p>

- 6 To view the options menu: Press Ctrl+Alt+C. (If the standard hotkeys were altered, use the new hotkeys plus C.)

Control screen	Parameter	Description
	Logoff	Select to close your current session and display the screensaver.
	Restore mouse functions	Select to revive a mouse that has ceased to function correctly. See <i>Keyboard and Mouse Hot Plug</i> on page 21 for details.
	Configuration	Select to gain access to the Unit, Network and Modem configuration screens. Within here you can also reset the ARQ3-EDS to its initial state.
	Access mode	Allows you to choose between Shared mode (where all other logged on users can see your operations) and Private mode (where the screens of all other users are blanked).
	Host	Indicates the currently selected host computer and allows you to select others. This item will be blank unless host details have been set within the remote configuration.
	Return to host	Quits the menu and returns to the host screen.

Configure with Serial Console

The serial console can be used to modify the IP address. The command is **ipsc** (this is currently under review and subject to change, if you consider it necessary to use this facility, please contact Adventiq). Without an argument the current IP configuration is displayed. A new IP address can be provided on the command line, this will be prompted for again when the script runs. When the script completes successfully, you need to:

- Kill the process startArkapp
- Kill the process arkapp
- Restart startArkapp (as background process)

You can also modify the IP address using a telnet session. However, if a network session is possible, the use of the VNC Server method described above is recommended.

VNC Client

Although any VNC client should work with the ARQ3 Evaluation & Development System, we recommend that you use the RealVNC Enterprise Edition Viewer.

Next

Usage Scenarios

This section considers various aspects of the setup, use and evaluation of some of the ARQ3-EDS capabilities. The detail provided here is limited. For further details see [2].

Video Sources

The ARQ3-EDS supports both digital and analog video monitor connections. The performance and behavior of the video processing is affected by the nature of the video source. The ARQ3 processing has optimizations which adapt depending on the video source and network bandwidth availability.

The ARQ3-EDS will operate with a range of video resolutions, up to 1600x1200@60Hz. Higher resolutions potentially require more processing by the system, affecting the update rate. When assessing the performance and switching between video modes, care should be taken to ensure that the video source correctly generates the video data in to the ARQ3-EDS¹.

ARQ3-EDS support of different video sources is complicated by the requirement to indicate its monitor capabilities to the host video source. This is achieved through the Display Data Channel (DDC). The ARQ3-EDS has only a single DDC that is used for both of the video inputs. To fully evaluate the video capabilities of the ARQ3-EDS it is necessary to modify the data that the DDC reports to the video source. It is expected that production systems would only require a single

1. *It has been observed that some PC video cards will scale display images to the highest resolution available in the connected monitor even when a lower resolution has been selected. The ARQ3 will process the data at the resolution it receives, which could be higher than the user thinks that they have selected and perhaps a misleading assessment. The ARQ3_EDS has facilities which can be used to change some of this behavior*

configuration of the DDC². The default shipping configuration for the ARQ3-EDS is for the analog video connector. The procedure to change to the DDC configuration is described in [1].

A range of video settings and sources should be tried to fully assess the capability of the ARQ3 system.

VNC Server Configuration

Once the basic network configuration of the ARQ3-EDS has been achieved (see *Server Software* on page 15), further configuration is easiest using a VNC Viewer.

Using the VNC Viewer session simply click the **Configure** button in the top right-hand corner of the window. For a description of the options in the resulting Configuration screen please see [2].

Network Configurations

The ARQ3-EDS provides an auto-sensing Ethernet IP port that can operate at 10 or 100Mbps. The ARQ3 system is designed to operate in environments with varying available network bandwidth and will operate over relatively slow network connections³. The capability is particularly evident using high resolution DVI video signals on a network with limited available bandwidth.

2. *Please contact Adventiq should there be a requirement for more than one DDC configuration to be supported in a product*
 3. *The ARQ3_EDS supports connection through an analog modem with viable frame update rates.*

Connecting – Auto Calibration

When you visit a host computer for the very first time, your viewer needs to determine the optimum video and mouse settings for that particular computer.

To this end, when a new computer screen is encountered by the system, the **Auto calibrate** button will flash red – click it to perform the auto calibration step.

Performing this step is important because it can help to decrease unnecessary video information being sent across the link, thus improving overall performance.

Note: Host computers that provide digital video do not need video calibration.

Keyboard and Mouse Hot Plug

It is strongly recommended that you switch off a host computer before attempting to connect it to the ARQ3-EDS. However, if this is not possible, you need to 'hot plug' the computer while it is still running. There is not normally a danger of damage to the computer. However, when PS/2 mouse communications are interrupted, often they fail to re-initialize when reconnected. The ARQ3 system provides a feature to reinstate PS/2 mouse communications once the necessary connections have been made. (This section does not apply if you are using a USB mouse.)

There are two main types of data formats used by current PC mice: the older PS/2 format, and the more recent IntelliMouse[®] format introduced by Microsoft. It is important to know which type of mouse was being used before you hot-plugged the computer to the ARQ3-EDS. The setting depends both on the type of mouse and the type of driver, as various combinations of PS/2 and IntelliMouse are possible. Using the incorrect restore function may produce unpredictable results and require the computer to be re-booted.

Using a keyboard and monitor directly connected to the ARQ3-EDS, log on and then press the hotkey sequence Ctrl+Alt+C to view the Options menu. Select **Restore mouse functions** and then the appropriate mouse type. For further information see [\[2\]](#).

Serial Console

The ARQ3-EDS provides a serial console connection to the core Linux operating system. Although this facility is generally not required, there are services that can be trivially run.

In addition, the console provides a message log of the boot process.

Other Features

Other features of the ARQ3-EDS that should be tried are the Remote Virtual Media and audio capabilities. For further details see [\[2\]](#).

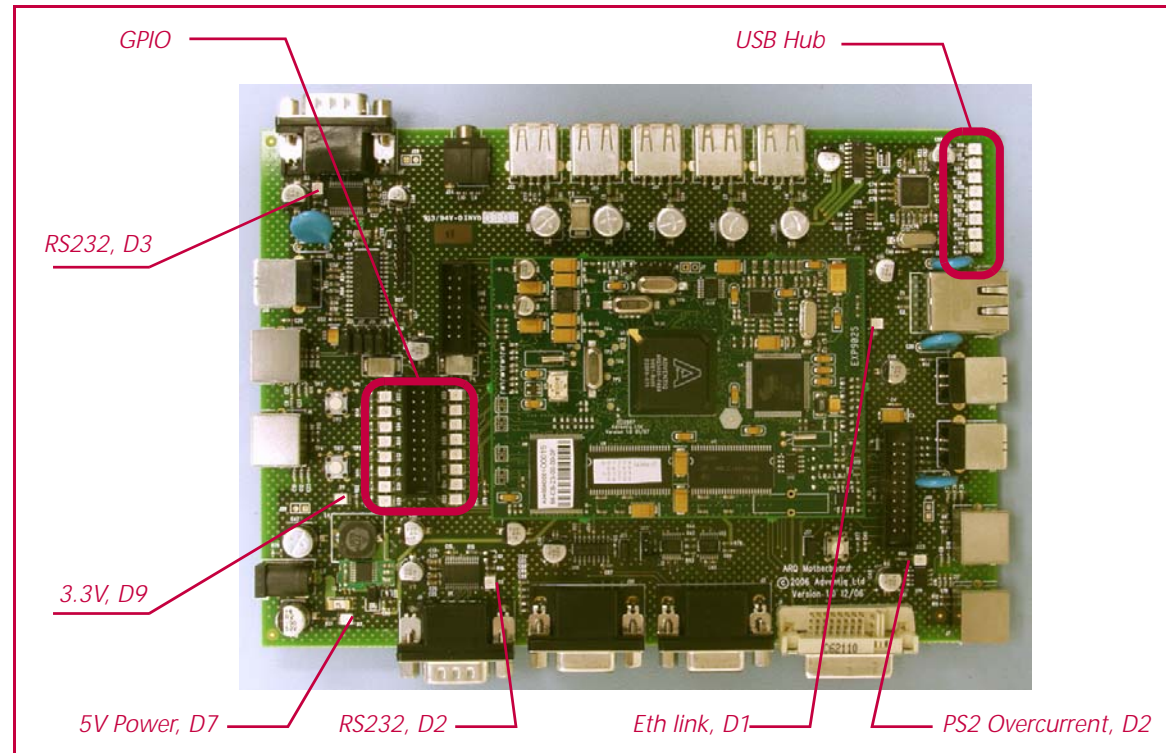
Further Information

For further information on the ARQ3 Module or ASIC please contact Adventiq.

Information available includes more detail on the design-in of modules and integration of the ASIC into systems.

LED Indicators

The Motherboard is populated with a number of LED indicators to assist the development process.



GPIO	D	D	D	D
15:12	20	19	18	35
11:8	26	25	24	23
7:4	22	21	34	33
3:0	32	31	30	29

USB Hub	Amber	Green
1	D10	D11
2	D12	D13
3	D14	D15
4	D16	D17

Troubleshooting

This section gives some quick reminders of what to look for if the evaluation system does not operate as anticipated. These instructions generally assume that the operator is located with the evaluation system.

For further assistance with troubleshooting please consult more detailed reference information and if necessary contact Adventiq

Power

There are a number of simple checks to ensure that the system is correctly power:

- LED D7 indicates that 5V supply is present
- LED D9 indicates that 3.3V regulated supply is being generated
- If there is no power to the Module, a visual check of the inter-board connectors should be made

Remote Connection

Here are some quick ways to gauge the operation of the system and connect to networked services if a VNC connection does not work:

- The configuration of the ARQ3-EDS network settings must be done with care. Incorrect configuration will hide the system from remote connections
- A simple http service at port :80 is provided; this can simplify checking a connection to the anticipated address
- Evaluation systems are distributed with a telnet server enabled, this can be used to verify the connection address
- If the network address configured is unworkable, the OSD facility or the serial console¹ will have to be used to configure the address

1. Various options for production systems are available – please contact Adventiq.

- If the Module detects a slow network connection, the system can adjust the amount of signal processing versus network bandwidth used². The VNC Server allows the user to select different options to observe the effectiveness of the different schemes. The video coding scheme generally used by the system is "hextile".

Local Connection

If a remote connection is not successful a local connection can indicate much more about the state of the system:

- The OSD facility will show the system configuration; a connection to the analog video feed thru port is required, as well as setting of the associated synchronization jumpers
- The serial console port provides detailed system messages

Telnet Server

The ARQ3-EDS are distributed with a telnet server. For this service to run it is necessary for the file "/ark/allowTelnet" to exist. If this file has been deleted, it can be created using the serial console. For the telnet service the default userid is "root" and the default password is "arq3".

Video Capture

If the VNC Server is operational but there is no video data being captured, check the following:

- Do video jumper settings match with the video connection (including the cable being used)?
- Is the host display blanked?
- Has the DDC been correctly configured (the host computer can be used to report the DDC settings provided back to the host)?

2. At initialization the server selects the initial color depth, which will not be automatically updated.

Keyboard and Mouse

The most common problem with keyboard and mouse connections is the incorrect setting of the control jumpers or the use of the wrong ports. If all checks fail to find a problem it is worthwhile checking the host operation with a direct connection to the host.

It has been observed with some analog video sources that the mouse response appears to be slow. This has been shown to be due to the analog signal being generated by the host computer to be very noisy. This results in effect the whole screen constantly being different. This can be verified in the video settings dialog where a high update rate is found even though the screen appears largely unchanging. Simple solutions in this case are:

- run the ARQ3/VNC video calibrate from the VNC viewer
- to increase the video threshold change value in the server options
- or more expensively improve the source video.

Another keyboard related issue that has been observed is when the legacy USB keyboard and mouse option is used but no keyboard or mouse are attached. Extra keyboard activity can result. This is a feature of how this interface is configured on the ARQ3 Development Motherboard and is not a feature of the ARQ3 ASSP or the ARQ3 Module PCB. Connecting to a host using USB should be via the USB B 1 port. The jumpers J13, J14, J16 and J17 should have the pins 1 & 2 linked, See "Host Keyboard & Mouse" on page 9.

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