Arm® Mali™ - IV009 Software Driver Release Note

Version r0p1-00eac0 / Revision r0p1

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Release Note – Arm® Mali™ - IV009 Software Driver r0p1-00eac0

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Product Status

The information in this document is Final, that is for a developed product.

Feedback on this product

If you have any comments or suggestions about this product, contact your supplier and give:

- The product name.
- The product revision or version.
- An explanation with as much information as you can provide. Include symptoms and diagnostic procedures if appropriate.

Feedback on content

If you have comments on content then send an e-mail to errata@arm.com. Give:

- The title.
- The number ARM-EPM-137775.
- The page number(s) to which your comments refer.
- A concise explanation of your comments.

Arm also welcomes general suggestions for additions and improvements.

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Contents

1 Product deliverables

1.1 Product release status

This is the Early Access (EAC) release of the Arm® Mali-IV009 Software Driver.

Early Access release status has a particular meaning to Arm of which the recipient must be aware. It should be noted that Support for the Early Access release of the deliverable will only be provided by Arm to a recipient who has a current support and maintenance contract for the deliverable. Significant additional verification has been completed on complex products as planned. However, there remain some elements of uncertainty, which cannot finally be validated until the deliverable has been successfully deployed by Partners. Accordingly, the recipient of a deliverable with Early Access (EAC) status may be directly contributing to the final stage of validation of that deliverable. Partners may enter at-risk production with IP at EAC status. In due course, the product deliverables will be released at Full Release (REL) status after final IP and silicon verification/validation is completed. There is still errata risk on complex products. Arm recommends volume production with IP at REL status.

1.2 About the Arm® Mali™-IV009 Software

Arm® Mali™ - IV009 Software is represented by the ISP Driver for the ARM compatible Arm® Mali™ - IV009 hardware. The driver is supplied in two main versions for Linux compatible platforms and for bare-metal systems. The key features of Arm® Mali™ - IV009 Software are:

- Cross platform. The driver is suitable for both Linux and bare-metal platforms.
- General interfaces for arbitrary sensors and lenses
- Reach Debug functionality including real-time trace information and ARM Control Tool
- V4L2 framework for communication with the external application under Linux systems
- High Quality 3A Library provided as open source
- Compatibility with ARM Calibration Tool in terms of calibrations
- BSP layer to isolate the software logic from the hardware.
- Control Tool for debugging and tuning purposes
- Calibration Tool to automate some tuning steps

1.3 About the Arm® Mali™-IV009 release note

This release note contains information about the usage, limitations and quality status of the accompanying deliverables. The tables in section 1.3.1 and 1.3.2 list the Arm part numbers for the individual deliverables included in the release of this Arm product. The deliverables, including this release note, are provided under their individual part numbers of the format IV009-xx-nnnnn-r0p1-00eac0. These deliverables are released together as a single deliverables bundle, IV009-BU-00000-r0p1-00eac0.

The files are delivered through Arm's IP delivery server (http://connect.arm.com). Most parts are grouped into a bundle for ease of unpacking into the working directory structure. Some parts are delivered individually for ease of maintenance and more frequent updates.

1.3.1 Technical documentation

Part Number	Description	Format	Revision
IV009-DC-06003	Arm Mali-IV009 Software Release Note (this document). Document number: ARM-EPM- 137775	PDF	r0p1-00eac0
IV009-DC-70032	Arm Mali-IV009 Software Technical Reference Manual. Document number: ARM-EPM-137349	PDF	r0p1-00eac0

1.3.2 Software

Part Number	Description	Version
IV009-SW-70010	ISP Driver SW Library Source	r0p1-00eac0

2 Installation

Intellectual Property (IP) deliverables are delivered as one or more UNIX zipped tar files. The installation instructions cover the UNIX operating system only.

Installation involves:

- Downloading the deliverables
- Unpacking the deliverables
- Copying all parts to your working area
- Building the ISP driver
- Running the ISP driver

Additional information may also be available in the release email notification from Arm.

2.1 Downloading the deliverables

To download the deliverables:

1. Click on the Connect http links in the release email.
2. Click on **Add to Download** for each bundle or deliverable.
3. After all items have been selected for download, click the **download** button and wait for the transaction to be built.
   The window is then refreshed to show the size of the transaction, a checksum number and a link called "Download Now" at the bottom of the page.
4. Click the **Download Now** link.
5. Save the `arm-download-<transaction_id>.tgz` file to the target machine.

2.2 Unpacking the deliverables

To unpack the deliverable:

Use the GNU gtar utility to unpack it with the following Unix command:

```
% tar -xzf arm-download-<transaction_id>.tgz
```

For each download from the Arm Connect IP Delivery Server, the following two extra files are created:

- `ARM_DELIVERY_<transaction_id>.TXT`
- `ARM_MANIFEST_<transaction_id>.TXT`

where `<transaction_id>` is a unique delivery number. These files should be used to view the contents (parts or files) of the delivery or to investigate possible download corruption problems.

- **`ARM_DELIVERY_<transaction_id>.TXT`** lists the downloaded parts and the constituent parts of any downloaded bundle.
- **`ARM_MANIFEST_<transaction_id>.TXT`** contains a manifest of all the files included in the transaction, together with their checksums. The checksums provided are calculated using the RSA Data Security, Inc. MD5 Message-Digest Algorithm. The checksums can be used to verify the integrity of the data using the md5sum tool (and is part of the GNU textutils package) by running (in Unix):

```
% md5sum --check ARM_MANIFEST_<transaction_id>.TXT
```

2.2.1 Directory structure

Unpacking the deliverable creates the following directory structure on the target machine:

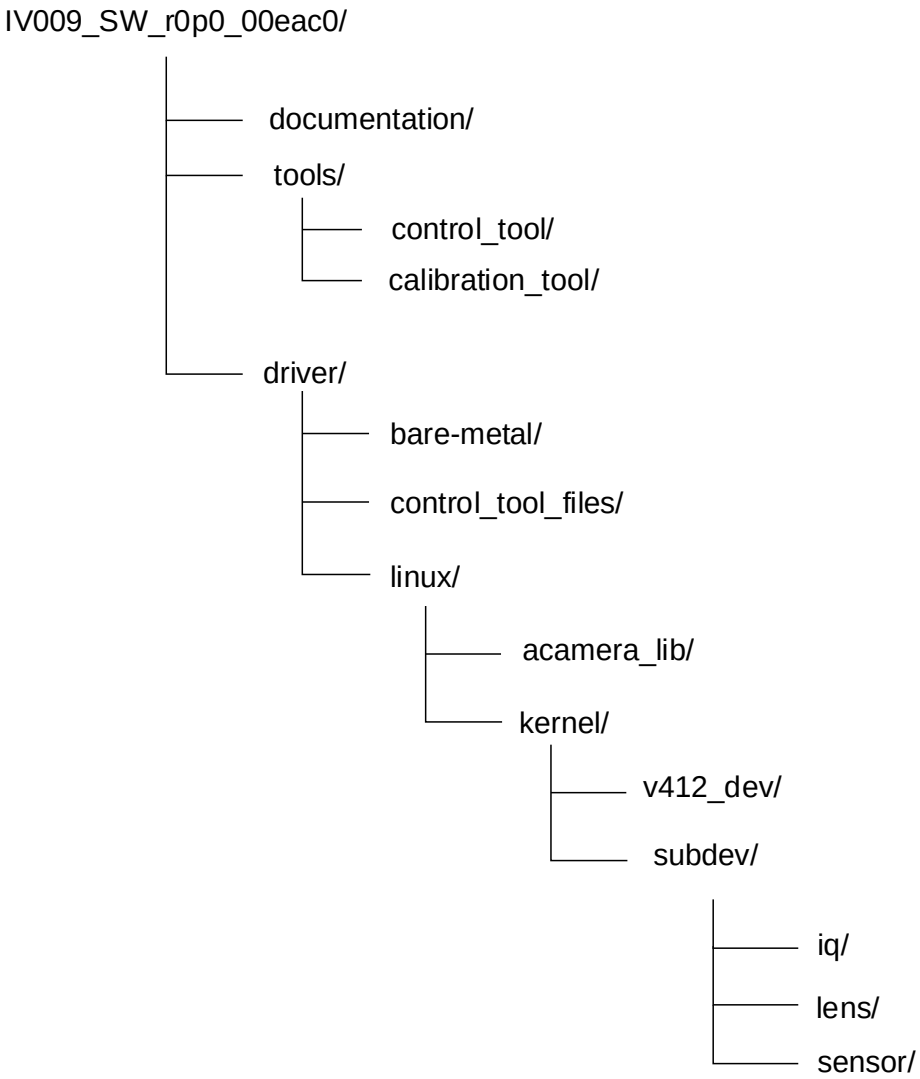

Figure 1. The Arm IV009 directory structure

Note: ***This is a simplified view of the installed directory structure. Some directories are not shown to aid clarity.***

2.3 Copying all parts to your working area

After unpacking the deliverables using GNU gtar, each bundle or separate deliverable will be contained in its own directory for example:

```
IV009-BU-00000-r0p1-00eac0/
```

Copy the contents of each supplied deliverable into your working area so that it appears at the same directory level as shown in Figure 1.

The following example assumes a working area top level directory called `Arm IV009 Software_sw_r0p1-00eac0`:

```
% cp -R <download>/IV009-BU-00000-r0p1-00eac0/* Arm® Mali™ - IV009 Software _sw_r0p1-00eac0/

% cp -R <download>/IV009-BU-60010-r0p1-00eac0/* Arm® Mali™ - IV009 Software _sw_r0p1-00eac0/documentation
```

2.4 Building the ISP driver

After copying all parts to your working area, you must build the ISP driver source code for your target platform. This section provides information related to the Linux platform.

Building the source code involves:

1. Porting the driver.
   Refer to the **Porting to the target platform** section of the IV009 Driver Technical Reference Manual.

2. Exporting the build variables.
   Some variables must be exported before starting the build process.

   The variable `CROSS_COMPILE` needs to be set with the target platform's compiler, for example:

   ```
   $ export CROSS_COMPILE=/toolchains/aarch64-linux-gnu/bin/aarch64-linux-gnu-
   ```

   Linux kernel related projects need to set the variable `KDIR` when building. This variable is the kernel source path and can be set as follows:

   ```
   $ export KDIR=/lib/modules/`uname -r`
   ```

3. Building the code.

   The build process is straightforward, use the make command to build drivers:

   ```
   $ make -j
   ```

2.5 Running the ISP driver

The procedure to run the ISP driver is different for different target platforms. This document only covers the procedure for a Linux system.

After the build is done you get the following four Linux kernel module files and one application binary.

```
$ insmod iv009_isp_iq.ko

$ insmod iv009_isp_lens.ko

$ insmod iv009_isp_sensor.ko

$ insmod iv009_isp.ko

$ ./iv009_isp.elf
```

You can use these commands to start/run the ISP drivers.

3 Known limitations of this release

The design includes all functionality in-line with the specification and has been assessed by Arm to be at EAC quality status.

4 Change list

This section lists the changes that have gone into the Arm® Mali™ - IV009 Software Driver r0p1 release.

- Buffer management redesign.
- Documents updates.
- Minor bugs fix.

5 Revision history

Date	Issue	Confidentiality	Change description
16/01/2018	LAC	Confidential	Initial Release
23/03/2018	EAC	Confidential	Initial Release for r0p0
28/09/2018	EAC	Confidential	Initial Release for r0p1