

Arm® Mali™ - IV009 Release Note

Version r0p0-00rel1 / Revision r0p0

06 February 2019

Release Note – Arm Mali-IV009 r0p0-00rel1

© Copyright Arm Limited 2017 - 2019. All rights reserved.

Confidential Proprietary Notice

This document is CONFIDENTIAL and any use by you is subject to the terms of the agreement between you and Arm or the terms of the agreement between you and the party authorised by Arm to disclose this document to you.

This document is protected by copyright and other related rights and the practice or implementation of the information contained in this document may be protected by one or more patents or pending patent applications. No part of this document may be reproduced in any form by any means without the express prior written permission of Arm. No license, express or implied, by estoppel or otherwise to any intellectual property rights is granted by this document unless specifically stated.

Your access to the information in this document is conditional upon your acceptance that you will not use or permit others to use the information: (i) for the purposes of determining whether implementations infringe any third party patents; (ii) for developing technology or products which avoid any of Arm's intellectual property; or (iii) as a reference for modifying existing patents or patent applications or creating any continuation, continuation in part, or extension of existing patents or patent applications; or (iv) for generating data for publication or disclosure to third parties, which compares the performance or functionality of the Arm technology described in this document with any other products created by you or a third party, without obtaining Arm's prior written consent.

THIS DOCUMENT IS PROVIDED "AS IS". ARM PROVIDES NO REPRESENTATIONS AND NO WARRANTIES, EXPRESS, IMPLIED OR STATUTORY, INCLUDING, WITHOUT LIMITATION, THE IMPLIED WARRANTIES OF MERCHANTABILITY, SATISFACTORY QUALITY, NON-INFRINGEMENT OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE DOCUMENT. For the avoidance of doubt, Arm makes no representation with respect to, and has undertaken no analysis to identify or understand the scope and content of, third party patents, copyrights, trade secrets, or other rights.

This document may include technical inaccuracies or typographical errors.

TO THE EXTENT NOT PROHIBITED BY LAW, IN NO EVENT WILL ARM BE LIABLE FOR ANY DAMAGES, INCLUDING WITHOUT LIMITATION ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES, HOWEVER CAUSED AND REGARDLESS OF THE THEORY OF LIABILITY, ARISING OUT OF ANY USE OF THIS DOCUMENT, EVEN IF ARM HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

This document consists solely of commercial items. You shall be responsible for ensuring that any use, duplication or disclosure of this document complies fully with any relevant export laws and regulations to assure that this document or any portion thereof is not exported, directly or indirectly, in violation of such export laws. Use of the word "partner" in reference to Arm's customers is not

intended to create or refer to any partnership relationship with any other company. Arm may make changes to this document at any time and without notice.

If any of the provisions contained in these terms conflict with any of the provisions of any signed written agreement covering this document with Arm, then the signed written agreement prevails over and supersedes the conflicting provisions of these terms. This document may be translated into other languages for convenience, and you agree that if there is any conflict between the English version of this document and any translation, the terms of the English version of the Agreement shall prevail.

The Arm corporate logo and words marked with ® or ™ are registered trademarks or trademarks of Arm Limited (or its subsidiaries) in the US and/or elsewhere. All rights reserved. Other brands and names mentioned in this document may be the trademarks of their respective owners. Please follow Arm's trademark usage guidelines at <http://www.arm.com/company/policies/trademarks>.

Copyright © 2017 - 2019, Arm Limited or its affiliates. All rights reserved.

Arm Limited. Company 02557590 registered in England.

110 Fulbourn Road, Cambridge, England CB1 9NJ.

LES-PRE-20348

Confidentiality Status

This document is Confidential. This document may only be used and distributed in accordance with the terms of the agreement entered into by Arm and the party that Arm delivered this document to.

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-136049.
- The page number(s) to which your comments refer.
- A concise explanation of your comments.

Arm also welcomes general suggestions for additions and improvements.

Note: Arm tests the PDF only in Adobe Acrobat and Acrobat Reader, and cannot guarantee the quality of the represented document when used with any other PDF reader.

Contents

1	Product deliverables	6
1.1	Product release status	6
1.2	About the Mali-IV009 image signal processor	6
1.3	About the Mali-IV009 release note	6
1.3.1	Technical Documentation	7
1.3.2	Implementation	7
1.3.3	Validation	7
2	Installation	8
2.1	Downloading the deliverables	8
2.2	Unpacking the deliverables	8
2.3	Merging the Deliverables	9
2.4	Directory structure	10
3	Known limitations of this release	11
4	Tool versions	12
5	Revision history	13

1 Product deliverables

1.1 Product release status

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

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 Mali-IV009 image signal processor

Mali-IV009 is a multi-camera, multi-exposure high dynamic range (HDR) image signal processor for the mid to high end consumer and surveillance market. It brings together some of Arm's most advanced imaging technologies like iridix®, sinter™, temper™ and chromatic aberration correction to provide an unrivaled image quality and support to a large number of HDR sensor formats.

1.3 About the 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](#), [1.3.2](#), and [1.3.3](#) 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-r0p0-00rel0 or IV009-xx-nnnnn-r0p0-00rel1. These deliverables are released together as a single deliverables bundle, IV009-BU-40000-r0p0-00rel1.

1.3.1 Technical Documentation

Part Number	Description	Format	Revision
IV009-DC-06002	Arm Mali-IV009 HW Release Note (this document). Document number: ARM-EPM-136049	PDF	r0p0-00rel1
IV009-DC-70021	Arm Mali-IV009 Configuration and Integration Manual. Document number: ARM-EPM-136047	PDF	r0p0-00rel0
IV009-DA-03001	Arm Mali-IV009 Technical Reference Manual. Document number: ARM-EPM-136919	PDF	r0p0-00rel0
	Arm Mali-IV009 Register Map. Document number: ARM-EPM-136050	PDF	r0p0-00rel0
IV009-MN-70030	Arm_Mali-IV009_IPXACT_README	Text	r0p0-00rel0
IV009-DC-13001	Arm Mali-IV009 C-model integration guide Document number: ARM-EPM-137521	PDF	r0p0-00rel0
IV009-DC-11000	Arm Mali-IV009 HW product errata	PDF	r0p0-00rel0

1.3.2 Implementation

Part Number	Description	Format	Revision
IV009-MN-22110	ARM Mali-IV009 Synthesizable RTL	Text	r0p0-00rel0
IV009-RM-70016	ARM Mali-IV009 Generic Implementation Infrastructure	Text	r0p0-00rel0
	implementation Base Enablement Package (iBEP) User Guide. Document number: ARM-EPM-137533	PDF	r0p0-00rel0

1.3.3 Validation

Part Number	Description	Format	Revision
IV009-MN-70002	RAM integration test bench	Text	r0p0-00rel0
IV009-MN-22010	Execution test bench	Test	r0p0-00rel1
IV009-SW-70011	Bit Exact Simulation Model	Executable	r0p0-00rel0

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
- Merging the deliverables

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
```

2.3 Merging the Deliverables

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

```
IV009-MN-22110-r0p0-00rel0/
```

```
IV009-DC-70021-r0p0-00rel0/
```

To merge the deliverables into a single installation directory:

Copy the contents of each supplied deliverable into the downloaded bundle directory so that it appears at the same directory level as shown in [Figure 1](#).

For example, using the following Unix command:

```
% mkdir mali_iv009
```

```
% cp -r IV009-BU-40000-r0p0-00rel1/* mali_iv009
```

```
% cp -r IV009-BU-60000-r0p0-00rel0/* mali_iv009
```

2.4 Directory structure

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

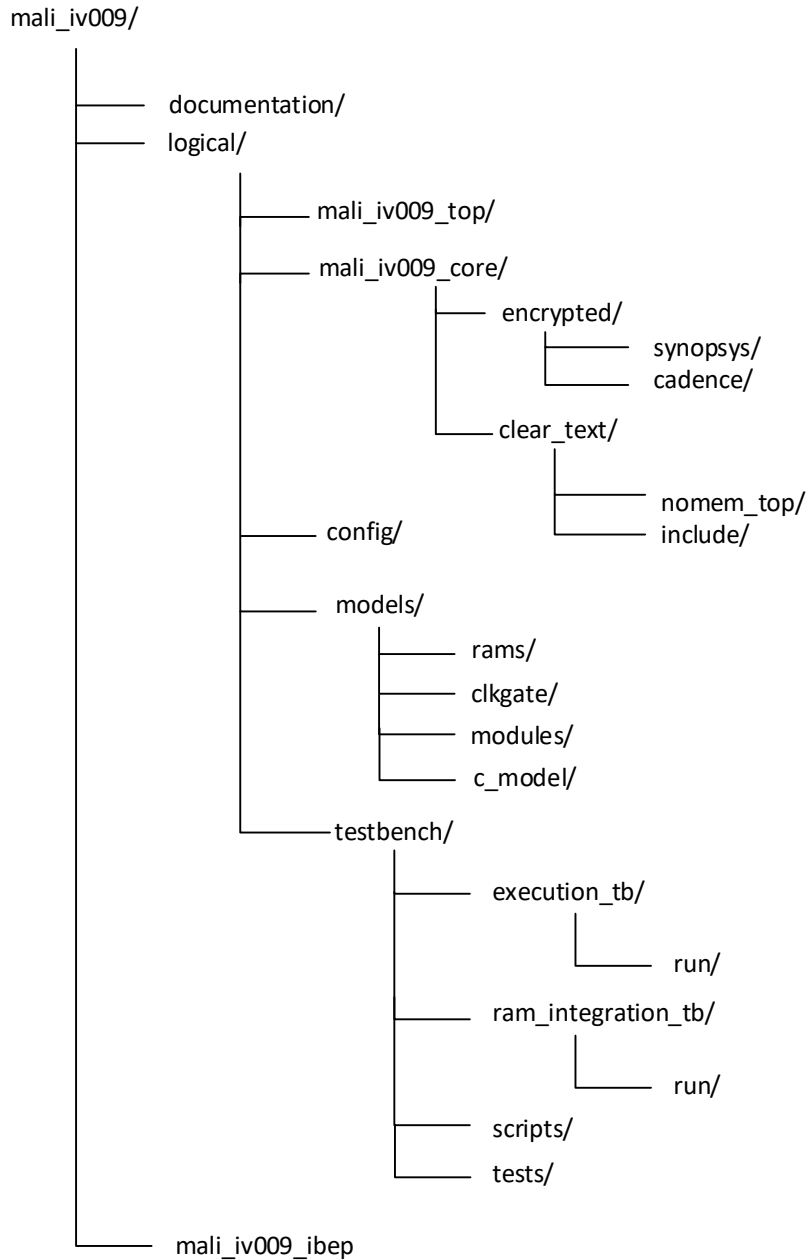


Figure 1. The Mali-IV009 directory structure

3 Known limitations of this release

The Arm Mali-IV009 Image Signal Processor (ISP) r0p0-00rel0 release has the following limitations:

- The release does not support IP-XACT.
- The simulation was performed only using VCS and IUS tools.
- libstdc++ is dynamically linked to the Lloyd_R0P0 executable.
GCC and libstdc++ versions mentioned in [section 4](#) are needed to run the Lloyd_R0P0 executable.

4 Tool versions

The following table lists the tool versions used during the development of the Mali-IV009 and are therefore known to work. Other tool versions may be used, but they have not been tested by Arm.

	Tool	Version
Platform OS	Red Hat Linux	Enterprise 6
Simulation Tools	Cadence IUS	15.20.017
	Synopsys VCS	2017.03-SP2
Implementation Tools	Genus	16.21.000
	Innovus	16.21.000
	Conformal	17.10.240
	QRC	16.10.000
	Tempus	16.23.000
	Joules	16.20.000
Other tools	GNU make	3.81 or later
	Python	2.7.13
	GCC	4.9.2 or later
	l1ibstdc++	3.4.20 or 3.4.21
	HAL	15.20.017

5 Revision history

Date	Issue	Confidentiality	Change description
29/12/2017	LAC	Confidential	Initial Release
16/03/2018	EAC	Confidential	EAC release
14/09/2018	REL	Confidential	REL release
06/02/2019	REL	Confidential	REL r0p0-00rel1 release