



Mali Android Display SW DDK
(DP9060000)
Product Errata Notice

This document contains all errata known at the date of issue in releases up to and including revision r1p0.

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General suggestions for additions and improvements are also welcome.

Contents

INTRODUCTION	5
ERRATA SUMMARY TABLE	7
SOFTWARE ERRATA	8
Category A	8
841669: Register access made after APB clock is disabled	8
842070: AFBC-compressed YV12 buffers cannot be displayed	9
852125: Memory corruption when memory write-out not in use	10
Category A (Rare)	10
842071: Underrun may trigger Kernel crash in IRQ handler	10
Category B	11
842069: Uncompressed YV12 buffers have U and V planes swapped	11
851721: Transform limitation of packed RGB888 is not properly validated in the driver	12
Category B (Rare)	12
Category C	12
842072: Partially constructed scene may be displayed during memory write	12

Introduction

Scope

This document describes errata categorized by level of severity. Each description includes:

- the current status of the erratum
- where the implementation deviates from the specification and the conditions required for erroneous behavior to occur
- the implications of the erratum with respect to typical applications
- the application and limitations of a workaround where possible

Categorization of Errata

Errata recorded in this document are split into classes:

Programmer	Those errata that impact the end-user/programmer of the hardware product. Software might observe the error and might require a software workaround or avoidance.
Implementation	Those errata that impact the hardware implementation of the hardware product. A hardware implementation flow workaround or avoidance might be required.
System	Those errata that impact the integration of the hardware product into the target system. A system-level hardware workaround or avoidance might be required.
Other	Those errata considered to be within the software product deliverables.

Within the above classes, errata are split into three levels of severity and further qualified as common or rare:

Category A	A critical error. No workaround is available or workarounds are impactful. The error is likely to be common for many systems and applications.
Category A (rare)	A critical error. No workaround is available or workarounds are impactful. The error is likely to be rare for most systems and applications. Rare is determined by analysis, verification and usage.
Category B	A significant error or a critical error with an acceptable workaround. The error is likely to be common for many systems and applications.
Category B (rare)	A significant error or a critical error with an acceptable workaround. The error is likely to be rare for most systems and applications. Rare is determined by analysis, verification and usage.
Category C	A minor error.

Change Control

Errata are listed in this section if they are new to the document, or marked as “updated” if there has been any change to the erratum text. Fixed errata are not shown as updated unless the erratum text has changed. The errata summary table on page 7 identifies errata that have been fixed in each product revision.

Note that where an errata document has been issued for a product using the legacy system of categorization, all errata will show as in the change control summary with status “New”. You should refer to the [Errata Summary Table](#) to identify new errata for this release of the product.

21 Aug 2015: Changes in Document v4

Page	Status	ID	Area	Cat	Rare	Summary of Erratum
10	New	852125	Other	CatA		Memory corruption when memory write-out not in use

27 Jul 2015: Changes in Document v3

Page	Status	ID	Area	Cat	Rare	Summary of Erratum
8	New	841669	Other	CatA		Register access made after APB clock is disabled
9	New	842070	Other	CatA		AFBC-compressed YV12 buffers cannot be displayed
11	New	842069	Other	CatB		Uncompressed YV12 buffers have U and V planes swapped
10	New	842071	Other	CatA	Rare	Underrun may trigger Kernel crash in IRQ handler
12	New	842072	Other	CatC		Partially constructed scene may be displayed during memory write
12	New	851721	Other	CatB		Transform limitation of packed RGB888 is not properly validated in the driver

Errata Summary Table

The errata associated with this product affect product versions as below.

A cell marked with **X** indicates that the erratum affects the revision shown at the top of that column.

ID	Area	Cat	Rare	Summary of Erratum	r0p0	r1p0
852125	Other	CatA		Memory corruption when memory write-out not in use	X	
842070	Other	CatA		AFBC-compressed YV12 buffers cannot be displayed	X	
841669	Other	CatA		Register access made after APB clock is disabled	X	
842071	Other	CatA	Rare	Underrun may trigger Kernel crash in IRQ handler	X	
851721	Other	CatB		Transform limitation of packed RGB888 is not properly validated in the driver	X	
842069	Other	CatB		Uncompressed YV12 buffers have U and V planes swapped	X	
842072	Other	CatC		Partially constructed scene may be displayed during memory write	X	

Software Errata

Category A

841669: Register access made after APB clock is disabled

Status

Affects: Mali Android Display SW DDK

Fault Type: Other Category A

Fault Status: Present in: r0p0 Fixed in r1p0.

Description

An issue exists in the driver whereby, in numerous circumstances in the Display DDK, read/write accesses will be made to DP500 registers after the DDK has requested for the APB clock to be disabled.

Implications

If there are no other references to the APB clock and the Linux clock framework has actually turned the APB clock off then when the registers are accessed the system is likely to hang (or demonstrate other instabilities)

Workaround

There is unlikely to be a runtime workaround once this Errata has occurred in the system however this issue can be avoided completely by not allowing the DP500 APB clock to be disabled. This can, for example, be achieved by taking and keeping an additional reference to the APB in the system so that the reference count never reaches zero. It should be noted that keeping the APB clock always on will mean that the DP500 hardware will continue to draw power even when the device is in an idle state (e.g. a phone with the screen turned off, sat in a users pocket not processing anything). The system power implications of keeping the APB clock enabled will depend on the structure of a customers implemented system.

842070: AFBC-compressed YV12 buffers cannot be displayed**Status**

Affects: Mali Android Display SW DDK
Fault Type: Other Category A
Fault Status: Present in: r0p0 Fixed in r1p0.

Description

When importing AFBC-compressed HAL_PIXEL_FORMAT_YV12 buffers the Mali-DP driver incorrectly sets a 'number of planes' variable to be greater than 1 which is an invalid configuration. In addition the pixel format variable is not converted correctly from the Android HAL_PIXEL_FORMAT_YV12 value into the internal format value used by the Mali-DP kernel driver. As such, when the userspace driver tries to commit a scene, containing such a buffer, the operation fails the driver's own validation steps and is rejected.

Implications

All AFBC-compressed HAL_PIXEL_FORMAT_YV12 buffers in a composition scene will trigger error messages from the Mali-DP driver in both the Android logcat logs and the kernel dmesg logs causing that frame to not be displayed on the screen.

Workaround

The errata can be avoided by disabling AFBC compression for all YV12 buffers and using uncompressed content instead.

852125: Memory corruption when memory write-out not in use**Status**

Affects: Mali Android Display SW DDK
Fault Type: Other Category A
Fault Status: Present in: r0p0 Fixed in r1p0.

Description

When a scene is posted to the kernel driver that does not make use of the memory write-out capabilities of the hardware a coding error in the kernel will cause an 'out-of-bounds' array access to be made. This access will write data in the memory adjacent to the array being accessed and corrupt whatever data was originally stored in the memory.

Implications

The memory corruption will trigger undefined behaviour, instability and potential crashes within the linux kernel, requiring the device to reboot.

Workaround

Always enable memory write-out

Category A (Rare)

842071: Underrun may trigger Kernel crash in IRQ handler**Status**

Affects: Mali Android Display SW DDK
Fault Type: Other Category A Rare
Fault Status: Present in: r0p0 Fixed in r1p0.

Description

When the Mali-DP kernel driver is preparing to commit a new scene an error in the Kernel Driver causes a register access to be made to the wrong Mali-DP configuration register. The erroneous access made will clear the under-run status flag of the hardware. If an under-run error has occurred and the scene committing code erroneously writes to the register before the IRQ handler runs then, when the handler runs, it will not be able to find the cause of the interrupt.

Implications

A BUG error will be triggered in the Linux kernel and the system will crash. A reboot of the system will be required.

Workaround

None.

Category B

842069: Uncompressed YV12 buffers have U and V planes swapped**Status**

Affects: Mali Android Display SW DDK

Fault Type: Other Category B

Fault Status: Present in: r0p0 Fixed in r1p0.

Description

When importing an uncompressed HAL_PIXEL_FORMAT_YV12 buffer into the Mali-DP driver the U and V plane pointers of the buffer are not correctly swapped to make them compatible with the hardware implementation.

Implications

All uncompressed HAL_PIXEL_FORMAT_YV12 buffers will be displayed on the screen with incorrect colors.

Workaround

In the buffer import integration layer of the Mali-DP driver the code can be updated to switch the U and V planes into the correct locations.

851721: Transform limitation of packed RGB888 is not properly validated in the driver**Status**

Affects: Mali Android Display SW DDK
Fault Type: Other Category B
Fault Status: Present in: r0p0 Fixed in r1p0.

Description

The DP500/DP550 hardware isn't capable of performing any transform on RGB888/BGR888 buffers. However, the kernel driver only validates 90 and 270 degree rotation cases, incorrectly allowing HFLIP, VFLIP and rotation 180 (HFLIP + VFLIP). Additionally, the user space driver doesn't do any validation for this limitation, incorrectly allowing all transforms to be performed.

Implications

If application sends packed RGB888 format with transform flag Rotation 90 or Rotation 270, the post will be rejected by kernel space driver, and that frame won't be displayed.

If application sends packed RGB888 format with transform flag Rotation 180, HFLIP or VFLIP, the post will be accepted and leads to undefined behavior.

Workaround

This can be avoided by using the GPU for packed RGB888 layers with a transform. SurfaceFlinger can be modified to set the "skip" flag on all packed RGB888 buffers with a transform flag. The display DDK will then reject these buffers and send them to GPU.

Category B (Rare)

Category C

842072: Partially constructed scene may be displayed during memory write**Status**

Affects: Mali Android Display SW DDK
Fault Type: Other Category C
Fault Status: Present in: r0p0 Fixed in r1p0.

Description

When the Mali-DP kernel driver is preparing to commit a new scene to the hardware registers it makes a register write, disabling the CONFIG_VALID register, to ensure that the hardware does not prematurely apply the new configuration while it is still being programmed. A error in the Kernel Driver causes this register access to be made to the wrong Mali-DP configuration register, potentially leaving the CONFIG_VALID register

enabled. When the memory write functionality of the Mali-DP hardware has been in use during the previous refresh cycle and a new frame is being programmed the CONFIG_VALID flag will remain enabled and the hardware can potentially apply the new configuration before it has been fully programmed.

Implications

A visual artefact may occur whereby parts of the new scene will be displayed alongside parts of the previous scene. This artefact will last for one refresh cycle before the correct scene is displayed.

Workaround

None.