Imageon™ 2182

Technical Reference Manual

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Technical Reference Manual
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1 Introduction

1.1 About this Manual

This Technical Reference Manual (TRM) is part of a set of reference documents that provide information necessary to design ATI's Imageon™ 2182 (W2182) Media Processor into a mobile phone platform.

1.2 ATI Component Part Number Legend

This manual covers Imageon™ 2182 , part 215W2182AKA22G, plus related devices with differing packaging options, and will be updated periodically to include the latest component revisions and respective added/changed specifications. Packaging variants of the part, which may incorporate in-package (integrated) SDRAM and other options, are also discussed.

The following figure shows how to read the coded information contained in the branded ATI component part number.

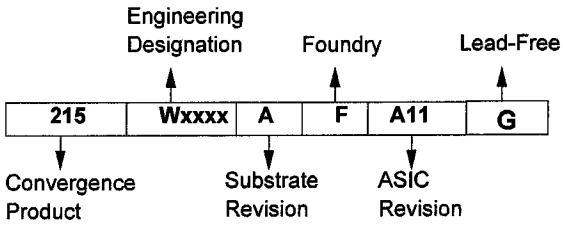

Figure 1.1: Imageon™ Part Number Coding Scheme

The following describes each field shown in Figure 1.1.

Convergence Product All parts are identified by the 215 code.

Engineering Designation These four digits, preceded by "W", identifies the engineering designation of the component. The last digit indicates the amount of memory (SDRAM) in MB that is integrated in the package (e.g. W2182).

Marketing Designation Consists of the Imageon™ trademark, followed by the Engineering Designation (e.g. Imageon™ 2182).

Substrate Revision This digit tracks the substrate revision for the component. The substrate revision is designated in alphabetical order: A = revision 1, B = revision 2, and so forth.

Foundry This letter identifies the foundry. Table 1.1 lists the letters assigned to different foundries.

ASIC Revision The three characters identify the ASIC revision.

Lead-Free A part number with a "G" identifier indicates that the part is lead-free.

Table 1.1: Foundry Codes

Foundry Code	Description
C	TSMC Fab3
S	TSMC Fab4
F	TSMC Fab5
G	TSMC Fab6
K	TSMC Fab12
L	TSMC Fab14
W	TSMC-WSMC
Q	TSMC-WSMC(8B)
T	TSMC WaferTech
U	UMC 8B (USC)
D	UMC 8D (USC2)
J	UMC 8E (Utek)

1.3 Conventions and Notations

1.3.1 Pin / Signal Names

Mnemonics are used to represent pins. For example, the Gate Clock pin and the Interrupt request pin are represented by GCLK and INTb respectively.

Note: All active-low signal names are identified by the suffix b (e.g. INTb).

1.3.2 Pin Types

The assigned codes for the various pin types based on operational characteristics are listed in Table 1.2.

Table 1.2: Pin Type Code

Code	Pin Type / Operational Characteristics
I	Input
O	Output
I/O	Bi-Directional
Pwr	Power
Gnd	Ground

1.3.3 Numeric Representation

Hexadecimal numbers are appended with "h" (Intel assembly-style notation) whenever there is a risk of ambiguity. Other numbers are assumed to be in decimal notation.

2 Overview

2.1 Introduction

Imageon™ 2182 (W2182) is a member of ATI's family of media processors specifically tailored for mobile camera phone applications and the support of Multimedia Messaging Services (MMS) as defined by 3GPP. It integrates stand-alone video decoding and encoding capabilities, an advanced 2D graphics engine, audio support for a variety of audio codecs, as well as a camera sub-system processing engine to support high resolution sensors. Powered by the highly optimized Imageon™ architecture, handheld devices will benefit from ultra low power dissipation and, therefore, a much longer battery life.

The Imageon™ 2182 offers complete self-contained video and audio processing– an ideal for MMS-capable handsets, and enables multimedia-rich applications, such as high quality video recording or playback; multimedia audio capabilities; powerful mobile gaming; and digital still camera replacement. End-users will enjoy the ultimate visual experience using their Imageon™ 2182 powered handsets.

2.2 System Block Diagram

The Imageon™ 2182 system block diagram is provided in Figure 2.1.

2.3 Features List

2.3.1 JPEG Full Encoder and Decoder

- fDCT / iDCT engine
- Quantization and variable length encode
- Produces CCITT T.81 compliant baseline sequential JPEG scan
- Supports ISO/IEC 10918-1 progressive decode
- Encode up to 1.3 Mpix images/Decode up to 5.0 Mpix images
- Single shot encoder of incoming video

2.3.2 MPEG-4 Decoder

- Full decoder, stand-alone with no host interaction required once configured. Accepts elementary stream input from the host, and displays decoded data in the overlay window on display.
- The decoder offers programmability to support video formats that are not 8x8 DCT based, such as Real Video 8/9.
- Full compliance with ISO/IEC14496-2 video simple profile levels L0-L1 and H.263 baseline

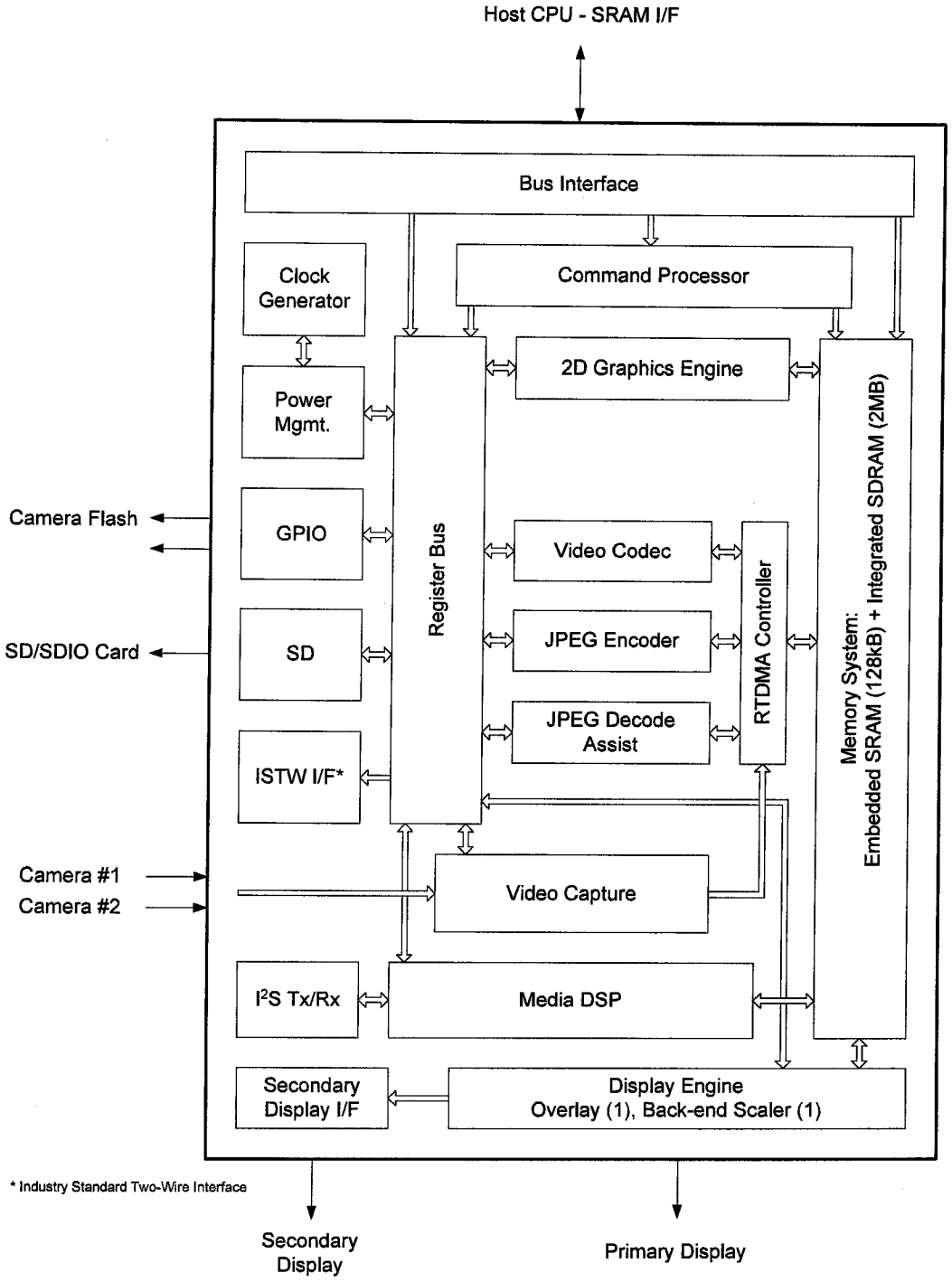

Figure 2.1: Imageon™ 2182 System Block Diagram

- Error recovery from single bit errors and burst errors; previous valid data displayed while next valid synchronization marker is searched.
- Supports up to QCIF resolution MPEG-4 decode at 15fps (performance depends on system clock speed and other constraints)

2.3.3 MPEG-4 Encoder

- Full encoder, stand-alone with no host interaction required once configured. Generates elementary stream for consumption by the host from the video capture port.
- Full compliance with ISO/IEC14496-2 video simple profile levels L0-L1 and H.263 baseline
- Supports up to QCIF resolution MPEG-4 encode at 15fps (performance depends on system clock speed and other constraints)
- Motion estimation
- Error resilience tools configurable to include resync and packet header information at either a specified time, or automatically on a reached data level; rate control algorithm adapts as required.

2.3.4 Advanced 2D Graphics

- BitBLT, ROP3 and ROP4
- DrawLine, Sprites
- Font caching, font antialiasing
- Scaling
- Alpha blending
- 90°, 180°, and 270° rotation
- Gouraud shading
- Scissoring
- Transparent BLT

2.3.5 Video Capture

- Connect video peripherals (such as a camera or TV tuner) to the handheld device
- Supports high resolution camera modules (1.3Mpixels with YUV Interface)
- Preview input image – downscale by 1/2/3/5/6/8/10/12
- Zoom Video Support – separate VSYNC, HSYNC
- Interlaced Image Support

- Image cropping through programmable capture rectangle
- CCIR656 (ITU-R 656), YCrCb 4:2:2 with 8-bit data bus
- Second capture port with 8-bit data bus
- Flash Light control and Red Eye minimization
- Independent horizontal and vertical VIP scaling
- Continuous Digital Zoom
- 2M pixel camera support with JPEG interface (supported for specific camera models; please contact ATI Applications Engineering for more information.)

2.3.6 Audio Support

The following lists the available audio components:

- AAC-LC CODEC
- AMR NB CODEC
- AMR WB CODEC
- MP3 CODEC
- WMA Decode
- SP-MIDI™ Synthesizer (with SMAF support)
- Real Audio 8 Decode
- aacPlus™ v1[1] (AAC-LC with Spectral Band Replication) CODEC
- aacPlus™ v2[2] (AAC-LC with Parametric Stereo) CODEC
- Bluetooth® SBC
- 3D Stereo Expansion
- 3D Enhanced/Positional Sound

The following audio interface is supported:

- I2S Interface (I2S bypass mode supported)

[1]aacPlus v1 = The term aacPlus is a trademarked property of Coding Technologies AB. The aacPlus v1 codec is a standard 3GPP implementation of High Efficiency AAC that includes Spectral Band Replication. Unofficially it is called "AAC+" in the market.

[2]aacPlus v2 = Refers to aacPlus v1 plus Parametric Stereo. It is a standard 3GPP implementation of Enhanced aacPlus. Unofficially it is called "AAC++" in the market.

2.3.7 Host Interface

Imageon™ 2182 interfaces seamlessly to the following CPUs:

- Intel® XScale
- Motorola MX family
- TI OMAP
- Infineon S-GOLD family
- Qualcomm MSM family
- Other ARM-based System-on-Chips
- A number of proprietary CPUs and baseband chipsets

2.3.8 Bus Configurations Supported

- Direct Addressing Mode: up to 24-bit address bus and 16-bit data bus
- Indirect Addressing Modes:
  - 1-bit address and 16-bit data bus
  - 1-bit address and 8-bit data bus
  - 1-bit address and 1-bit data (using SPI)
- Enhanced performance mixed mode with Direct Addressing writes and Indirect Addressing reads
- I2S/SSI Interface

2.3.9 Integrated Frame Buffer

- Double-buffer support for up to QCIF+ (176x220) resolution

2.3.10 Display Support

Primary:

- 8 bit monochrome
- 12/15/16/18 bit color STN
- 12/15/16/18 bit TFT
- 8 / 16-bit parallel CPU-like interface (CLI)
- Maximum resolution 220x176
- Partial display refresh