



GoForce 5500

Handheld GPU

The NVIDIA® GoForce 5500 Handheld GPU brings new features to your cell phone or handheld device that far exceed expectations. Now, in the device that you carry with you every where, you can:

- Capture pictures you can enlarge to poster-size (20 x 24 in / 50 x 60 cm)
- Watch digital (DVB-H) television
- Capture or playback DVD-quality video
- Play awesome 3D games
- Video conference with the same quality as a dedicated, hard-wired system
- Playback WMV or Real Video formats
- Capture MPEG4 video at D1 resolution
- Instant message or navigate semi-transparent menus while video plays in the background.
- Listen to hours of music, regardless of format (MP3, AAC, WMA, Real, etc.)
- Support for a tablet-size PC display

H.264/AVC VIDEO CODEC

The addition of a dedicated hardware-based H.264/AVC codec makes it possible to watch DVB-H broadcasts any where -- any time. By supporting full D1 resolution at an amazing 30fps during playback, the quality of the videos you watch is comparable to a DVD.

You can also create your own high-quality H.264 movie, or host a H.264 video conference, right on your handheld device, with QVGA resolution at 15fps.

10MP IMAGE SIGNAL PROCESSOR

Incorporating an ISP into GoForce 5500 has increased the supported camera resolution to an unprecedented 10 megapixels. This is higher than many professional digital still cameras, and will enable the production of exceptionally large prints with high levels of detail.

The built-in ISP supports Bayer data and performs operations such as auto-exposure and white balance, as well as edge enhancement, gamma correction, and dead pixel detection. It also will collect statistics for auto focus.

DEDICATED AUDIO ENGINE

A programmable audio engine inside GoForce 5500 supports simultaneous encoding and decoding of AMR or AAC audio in conjunction with video conferencing, camcorder, or video playback -- all with virtually no MIPS requirements on the baseband or CPU.

Additional audio formats including MP3, WMA, and Real are supported for listening to music at high-quality bit rates up to 320kbps.

XGA DISPLAY WITH 16.8 MILLION COLORS

To support applications in wide variety of different devices with screen sizes from small to large, the GoForce 5500 can

support LCD sizes as large as XGA (1024 x 768), with 16.8 million colors -- even in 3D mode!

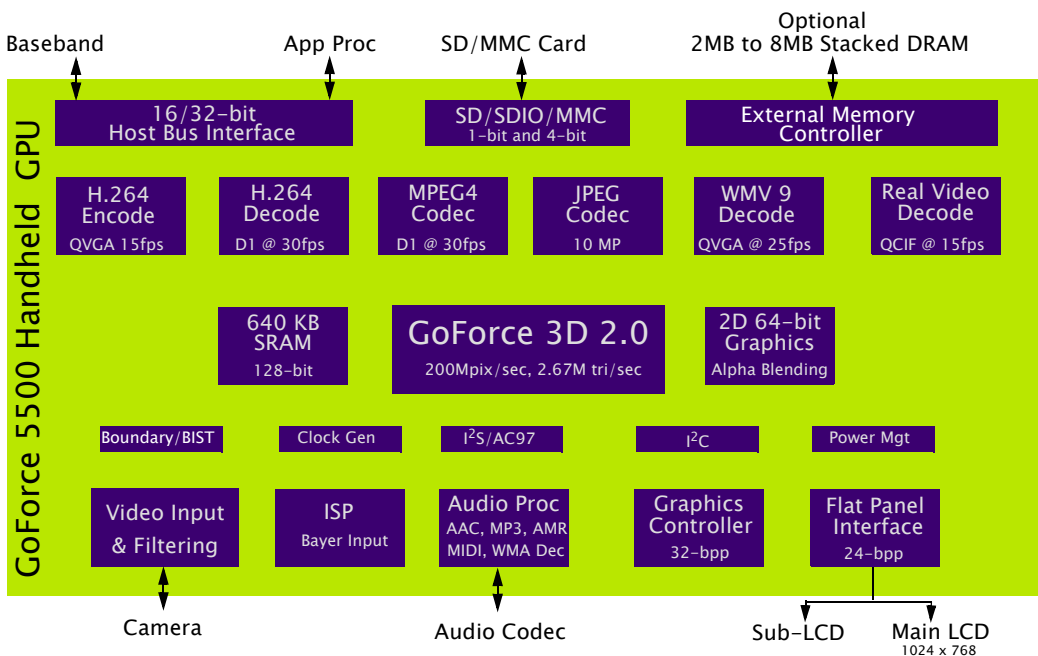
Enhanced alpha blending modes make it possible to show semi-transparent menus over the top of video.

AWESOME 3D GRAPHICS

With a programmable pixel shader, five simultaneous textures, 2.67 million triangles per second, and support for Open GL-ES, and Java, the GoForce 5500 provides high quality, high performance 3D that sets a new standard for 3D on a handset.

MAJOR UPGRADES VS. GoFORCE 4800

- H.264 Hardware Codec
- WMV and Real Video Decode
- 10MP Camera Support (Bayer)
- D1 Resolution MPEG4
- Image Signal Processor
- Alpha Blending (advanced)
- Audio Engine (AMR, AAC, MP3)
- External Memory Controller
- XGA resolution LCD
- 16.8 million colors
- 200 million pixels/sec. 3D fill rate
- I²S/AC97 interface
- Flexible Image Rotation





3D GRAPHICS ENGINE V2.0

- OpenGL® ES compliant with NVIDIA extensions
- 200 million pixels/sec. 3D fill rate
- 2.67 million drawn triangles/second
- 128-bit interface to internal memory
- 32-bit interface to stacked memory
- Transform engine
- 40-bit color pipeline
- 5 simultaneous textures
- Signed overbright color
- 7 surfaces (color, Z, texture 1..5)
- 16 4-bit palettes or one 8-bit palette
- Programmable pixel shader
- Bilinear/Trilinear texture filtering
- Fixed & Floating point data
- XGA [1024x768] support in 3D mode
- Setup & pixel processing in hardware

AUDIO ENGINE

- Programmable Core
 - I²S/AC97 codec interface
- #### DECODE
- AMR NB [12.2kbps] and WB [23.5kbps]
 - AAC LC, HE-AAC (AAC+), AAC+ Enhanced [128kbps]
 - MP3 [320kbps]
 - AAC [320kbps]
 - WMA, WAV & PCM
 - Real Audio 8, 9, 10
 - Bluetooth SBC
- #### ENCODE
- AMR NB [12.2kbps] and WB [23.5kbps]
 - AAC LC [128kbps]
 - MP3 [320kbps]
 - Bluetooth SBC
- #### MIDI
- Support for SP-MIDI, DLS, XMF
 - 64 voice polyphony at 22kHz
 - Standard Sound Bank
- #### AUDIO EFFECTS
- Stereo Widening, Equalization, Noise Cancellation, Mixer, Acoustic Echo Cancellation, Environmental Effects

H.264 VIDEO CODEC

- H.264 Decode at 720x480 @ 30fps or 720x576 @ 25fps [D1 Resolution]
- H.264 Encode QVGA @15fps [384kbps]
- H.264 Codec QVGA @15fps [384kbps]

WMV AND REAL VIDEO DECODER

- WMV decode QVGA @ 25fps [SP, Low]
- Real Video 9 decode at QCIF @ 15fps

IMAGE SIGNAL PROCESSOR (ISP)

- Optical black calibration
- "De-knee" compensation
- Lens-shading (radial) compensation
- Exposure compensation
- White balance
- Defective pixel correction
- De-mosaicing & de-noising
- Edge enhancement
- Color correction to sRGB
- Gamma correction
- Color conversion (to YUV)

- Statistics gathering for Auto Exposure, Auto White Balance, and Auto Focus

MPEG4 / H.263 HARDWARE CODEC

- D1 encode or decode at 30fps
- Full duplex D1 @ 30fps
- MPEG4 Simple Profile, Level 0 to 5 (ISO/IEC 14496-2)
- H.263 Profile 0, Level 50
- Back-end MPEG4 video processing including hardware color space conversion and image scaling
- De-blocking and de-ringing filters to reduce the visibility of compression artifacts during playback

JPEG HARDWARE CODEC

- 10MP encode or decode using ISO/IEC 10918 Baseline
- Motion JPEG capture/playback
- Low shutter lag image capture
- Composite, framing, and overlay
- Thumbnail support (store both image and thumbnail in same file)
- Support Huffman decode for JPEG
- Programmable quantization table
- Hardware DCT, RLE, Huffman encode

HIGH RESOLUTION COLOR DISPLAY

- Support for XGA [1024x768] LCD
- Double-buffering support for VGA and lower resolution display
- Fast switching between main/sub-LCD
- Hardware support for sub-LCD display
- Up to 24-bpp panel support

SD/SDIO HOST CONTROLLER

- 1-bit and 4-bit SD/SDIO
- Support for storage or wireless cards

VIDEO INPUT (BAYER & YUV)

- 10MP Bayer camera module support via 10-bit RGGB Bayer Interface
- 5MP Bayer @ 15 fps
- 3MP @ 10fps camera preview via ITU-R 656-compliant 8-bit interface
- 96MHz output to camera master clock
- Horizontal scaling with horizontal averaging and low-pass filtering
- Vertical averaging
- I²C for camera control & programming
- YUV422 to RGB565 color space conversion
- Single- and double-buffering support
- Double buffering synchronization with graphics controller
- Image/Video Rotation

64-BIT 2D GRAPHICS ACCELERATION

- BitBLT with 256 3-operand raster ops
- Video scaling with range of 8x expansion to 1/64th contraction
- Mono and solid pattern
- Mono-to-color expansion
- Mono source/pattern transparency
- Destination read/write color transparency
- All-angle Bresenham line draw
- Rectangle fill
- Image/Video Rotation

- Alpha Blending

FLAT PANEL (LCD) INTERFACE

- 16.1 million colors in 18-bpp mode
- 16.8 million colors in 24-bpp mode
- Direct interface to LCD drivers with embedded memory
- Built-in timing generator
- Color TFT at 9, 12, 16, 18, 24-bit/clock
- Partial pixel-per-clock mode
- CPU, RGB, Serial, M-CMADS, AMLCD, LTPS, SPI and Sharp ULC support
- Support for over 80 popular displays, including OLED.

GRAPHICS CONTROLLER

- Alpha Blending
- 16 to 24-bpp color expansion
- Color Space Conversion (YUV to RGB)
- Hardware rotation (90°, 180°, 270°)
- Flip and mirror
- Partial display support (any size/position)
- Triple 6-bit look-up-table
- Overlay support
- Encode predefined region of display

INTEGRATED 640KB 128-BIT WIDE SRAM

- 640KB of 128-bit wide on-board frame, video, and transactional buffers

32-BIT FLEXIBLE HOST BUS INTERFACE

- Indirect and direct addressing support
- 16/32-bit asynchronous interface for baseband processors (ARM based)
- Burst mode support
- Fixed and variable latency host bus
- Automatic address incrementing
- Programmable interrupt

CLOCK OPTIONS

- On-chip oscillator for 2 to 13MHz xtal
- Digital bypass mode for external clock sources (e.g. baseband or CPU)
- Low-power relaxation oscillator
- Two on-chip PLLs with independent VCOs (range of 50MHz to 400MHz)

NVIDIA NPOWER POWER MANAGEMENT

- Fully-static CMOS technology
- Low-power 90nm process
- Individual module enables
- Automatic shut-off of unused pipeline stages

PACKAGING & VOLTAGE

- Available with 2MB stacked, 8MB stacked, or external memory interface (up to 32MB external)
- JTAG boundary scan & BIST
- 0.95 to 1.32V core, 1.71V to 3.30V I/O

STACKED MEMORY/PACKAGE DETAILS

	2MB	8MB	XT
Core Speed (MHz)	200	200	200
Embedded SRAM	640KB	640KB	640KB
Stacked Memory	2MB	8MB	--
Thickness (mm)	1.4	1.4	1.4
Dimensions (mm)	10x10	10x12	10x12
Ball Count	284	284	288
Ball Grid	18x18	18x18	18x18

