

C5221-PBR-01C
September 2003

VGA+DVI+Video Multi-function LCD Monitor Controller

The gm5221 device is an all-in-one LCD monitor controller supporting resolutions up to SXGA (1280x1024). The gm5221 leverages Genesis patented advanced image-processing technology as well as a proven integrated ADC/PLL, an Ultra-Reliable DVI™ compliant digital receiver, and a CCIR656 video input port to deliver a high-quality, low cost solution for multi-function LCD monitors. On-chip, industry standard, single/double-pixel, four-channel LVDS 6/8-bit transmitters connect directly to commercial available LCD panel modules. In addition, an integrated X86 microcontroller and OSD engine are provided. This high level of integration reduces the number of components. This reduces system cost, improves reliability and simplifies monitor design.

gm2221 is a pin-compatible derivative product with integrated ADC and video input, but no DVI receiver.

FEATURES

- Zoom (from VGA) and shrink (from UXGA) scaling
- Integrated 8-bit triple-channel ADC / PLL
- Integrated Ultra-Reliable 165MHz DVI 1.0-compliant receiver
- CCIR656 compliant 8-bit video input port
- Integrated LVDS transmitters
- Embedded X86 microcontroller
- On-chip versatile OSD engine meets PC OEM specs
- All system clocks synthesized from a single external crystal
- Advanced color controls for enhancement, sRGB support
- **Intelligent Image Processing™**
 - Fully programmable zoom ratios
 - High-quality shrink capability from UXGA resolution
 - Programmable coefficients for variable sharpness control
 - Edge enhancement
 - RealRecovery™ function provides full color recovery image for refresh rates higher than those supported by the LCD panel
- **Analog RGB Input**
 - Supports up to 162 MHz (SXGA 75Hz / UXGA 60Hz)
 - On-chip high-performance PLLs (single reference crystal required)
 - Composite-sync and Sync-on-Green (SOG) support
 - Input format detection
 - Phase and image positioning
- **Ultra-Reliable DVI™ Input (gm5221)**
 - Operating up to 165 MHz (up to UXGA 60Hz)
 - Direct connect to all DVI-compliant digital transmitters
 - High-bandwidth Digital Content Protection (HDCP)

Note: HDCP function is available in gm5221H version only.
- **CCIR 656 8-bit Video Input**
 - Connects to commercially available NTSC / PAL video decoders
 - Spatial de-interlacing
- **Advanced Color Management**
 - TV color controls including hue and saturation controls
 - Full color matrix allows end-users to experience the same colors as viewed on CRTs and other displays (e.g. sRGB compliance)
 - Advanced Active Color Management™ (ACM-II) provide flesh-tone compensation and image enhancement
 - Adaptive Contrast and Color™ (ACC) ensures full dynamic range is used in video content
- **On-chip OSD Controller**
 - On-chip RAM for high-quality programmable menus
 - 1, 2 and 4-bit per pixel character cells
 - Horizontal and vertical stretch of OSD menus
 - Blinking, transparency and blending
 - Supports two independent OSD menu rectangles
 - Proportional fonts
- **X86 On-chip Microcontroller**
 - High-performance X86 MCU with on-chip RAM and ROM
 - External parallel ROM or serial SPI ROM interface
 - Unified memory architecture simplifies chip programming
 - 21 general-purpose inputs/outputs (GPIOs) available
 - Integrated 2-wire serial bus master to control NVRAM, video decoder
 - Two DDC2Bi with DMA buffer to internal RAM
 - Four PWM's for analog output control of backlight, audio, etc.
 - General-purpose ADC's for keypad and temperature sensing
 - Slow clock mode for 50mW sleep mode power consumption
 - On-chip reset circuit to eliminate external reset IC
 - ICE support for firmware debugging
- **Built-in Test Pattern Generator**
 - Simplifies manufacturing / test
- **Energy Spectrum Management (ESM™)**
 - Digital clock spectrum management
 - Eliminates EMI suppression components and shielding
- **Built-in LVDS Transmitters**
 - Four channel 6/8-bit LVDS transmitters
 - Support for 8 or 6-bit panels (with high-quality dithering)
 - Single / double wide up to XGA 75Hz output
 - Pin swap, odd / even swap and red / blue group swap of RGB outputs for flexibility in board layout
- **Highly integrated System-on-a-Chip**
 - All system clocks synthesized from a single external crystal
 - 50mW power saving mode
 - 5-Volt tolerant inputs
 - Two Layer PCB support
 - Integrated Schmitt trigger for HSYNC and VSYNC

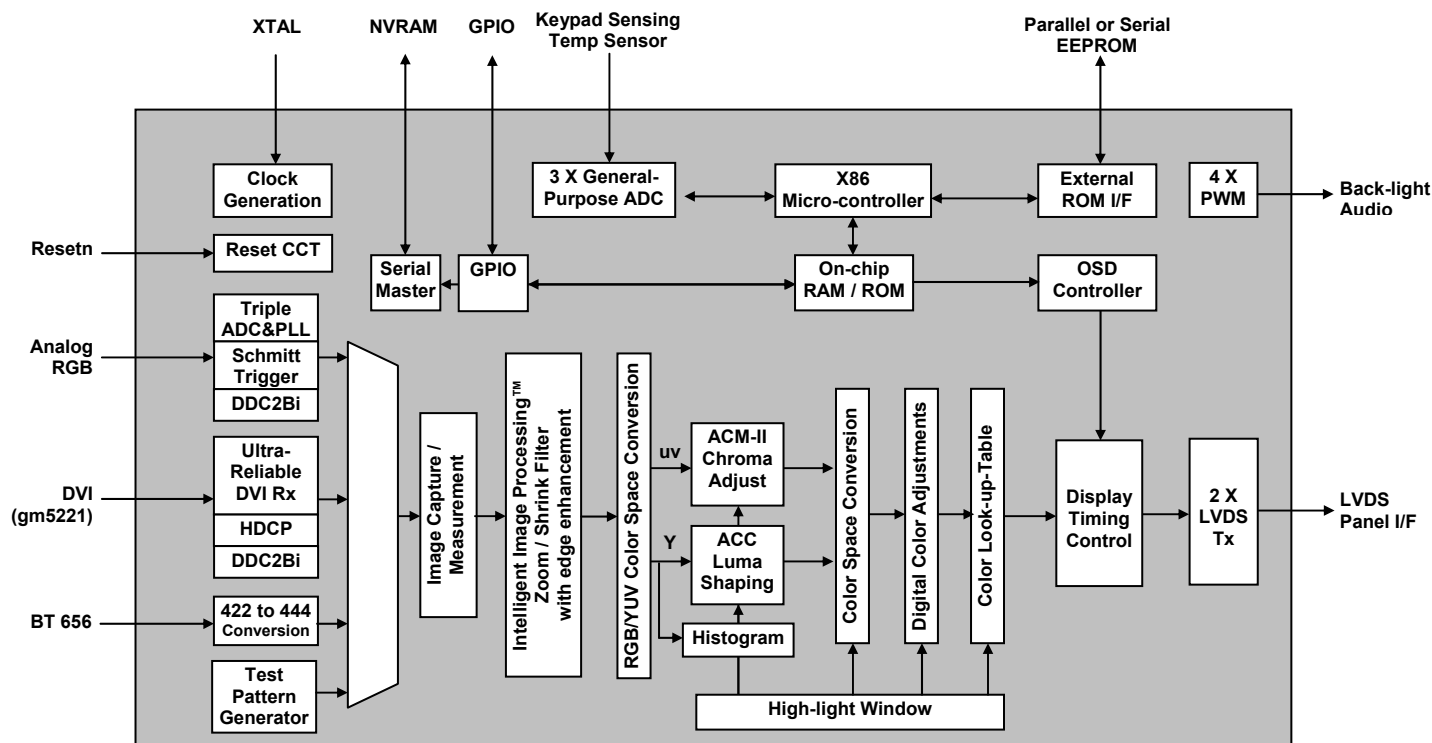
PACKAGE

- 3.3V IO and 1.8V CORE power supplies
- 208-pin PQFP

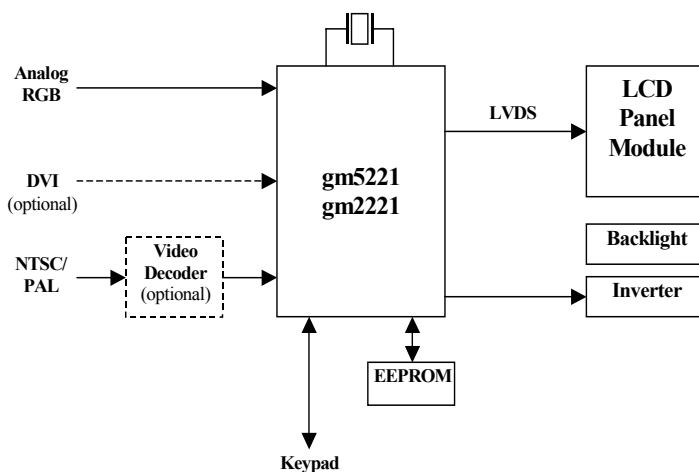
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gm5221 Functional Block Diagram



gm5221 Multimedia Monitor Design Example



Note: RealColor, Real Recovery, Ultra-Reliable DVI, Adaptive Contrast and Color, Advanced Active Color Management and Intelligent Image Processing are trademarks of Genesis Microchip Inc.