FLI2510, FLI2515, FLI2520

High-performance Faroudja video enhancement processors

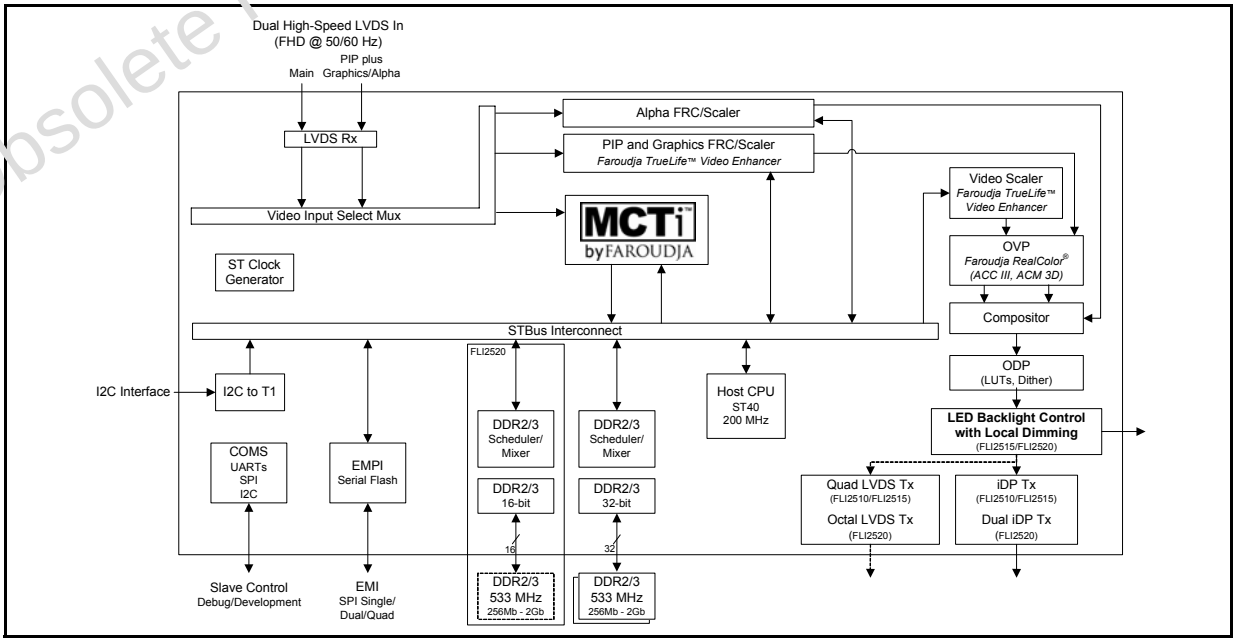
Data brief

Features

- Faroudja® Motion-Corrected Temporal Interpolation (MCTi™) Frame Rate Conversion (FRC) for 2D and 3D content
- Horizontal and vertical motion search
- LED backlight control with local dimming for 100/120 Hz panels (FLI2515) and 200/240 Hz panels (FLI2520)
- 240 Hz (FLI2515) and 480 Hz (FLI2520) scanning LED backlight controller
- Full support for HDMI 1.4a mandatory 3DTV input formats
- Integrates auto 2D to 3D video/text conversion and depth control
- High-speed, dual-channel LVDS receiver
- Independent video and graphics/Picture in-Picture (PIP) processing paths
- Graphics/PIP processing path supports RGB input with separate alpha
- Faroudja 14-bit RealColor® processing
- DDR2/DDR3-1066 Mbps 32-bit (FLI2510/FLI2515) and 48-bit (FLI2520) DRAM I/F
- On-chip microprocessor with STAPI interface to front-end DTV controller
- Vertical and horizontal display flip
- Single (FLI2510/FLI2515) or dual (FLI2520) Internal DisplayPort (iDP v1.0) transmitter to drive 120/240 Hz panels
- Quad (FLI2510/FLI2515) or octal (FLI2520) LVDS transmitter to drive 120/240 Hz panels
- Low frame latency game mode

Applications

- Performance TV video enhancement processor for:
  - 100/120 Hz 1080p LCD panels
  - 100/120 Hz 1080p LCD panels with LED backlight control with local dimming
  - 200/240 Hz 1080p LCD panels with LED backlight control with local dimming



1 Description

STMicroelectronics' FLI25xx series of ICs are best-of-breed TV back-end video enhancement companion controllers designed to be coupled with DTV front-end processors such as STMicroelectronics' FLI75xx SoCs. The FLI25xx series enables three truly innovative high-end system features: motion judder reduction, motion blur removal, and (for FLI2515/FLI2520) LED backlight control with local dimming.

Motion judder reduction and motion blur removal are achieved through the use of the FLI25xx series' unique Faroudja Motion-Corrected Temporal Interpolation (MCTi) algorithms. The FLI25xx ICs utilize industry-leading vector estimation to interpolate in-between frames to correct film motion judder and panel motion blurring. Combining the artistic elements of film with the linear motion of video, the FLI25xx family provides audiences with a uniquely enjoyable viewing experience.

As the TV market moves to larger panel sizes, the importance of increased video quality and decreased power consumption is becoming even more apparent. FLI2515 and FLI2520, of the FLI25xx series of ICs, directly address these issues by delivering state-of-the-art, intelligent LED backlight control with local dimming. By dynamically controlling the LED backlight on a regional basis, FLI2515 and FLI2520 allow for a considerable reduction in power consumption as well as a significant improvement (10'-visible!) in brightness, contrast, black levels, and overall video quality.

In addition to the new innovative technologies, the FLI25xx series also provides high interconnectivity through its integrated dual-channel high-speed LVDS receiver, quad/octal LVDS transmitter, and single/dual Internal DisplayPort (iDP v1.0) transmitter, as well as renowned dual-channel video processing based on Faroudja technologies.

With its superior motion judder reduction and motion blur removal system, sophisticated LED backlight control with local dimming technology, advanced interconnectivity options, and unparalleled dual-channel video processing, the FLI25xx video enhancement companion controller is the ideal solution for high-quality, cost-effective iDTVs.

Table 1. FLI25xx selection table

Part number	Application	Memory interface	iDP outputs	LVDS outputs
FLI2510	100/120 Hz 1080p LCD panels with MCTi FRC	32-bit (2x16-bit DDR1066)	1	4
FLI2515	100/120 Hz 1080p LCD panels with MCTi FRC, LED backlight control with local dimming, and LED backlight scanning to achieve a 240 Hz motion blur reduction effect	32-bit (2x16-bit DDR1066)	1	4
FLI2520	200/240 Hz 1080p LCD panels with MCTi FRC, LED backlight control with local dimming, and LED backlight scanning to achieve a 480 Hz motion blur reduction effect	48-bit (1x32-bit or 2x16-bit + 1x16-bit DDR1066)	2	8

2 Feature attributes

- Integrated high-speed LVDS receiver
  - Dual-channel, high-speed (1.15 Gbps) LVDS receiver
  - Supports up to 1080p input @ 50/60 Hz
  - Single or dual stream modes of operation
- MCTi by Faroudja
  - Reduces film motion judder associated with 2:2 and 3:2 film sources to produce smooth, linear motion for 100/120/200/240 Hz displays
  - Removes LCD motion blur for 50/60 Hz video sources for 100/120/200/240 Hz displays
  - MCTi Film 25 to 100 Hz
  - MCTi Film 25 to 100 with frame double to 200 Hz
  - MCTi Film 24 to 120 Hz
  - MCTi Film 24 to 120 with frame double to 240 Hz
  - MCTi Video 50 to 100 Hz
  - MCTi Video 50 to 200 Hz
  - MCTi Video 60 to 120 Hz
  - MCTi Video 60 to 240 Hz
  - Processes both 2D and 3D content sources (for 3D content, the left eye and right eye are processed independently for best results)
  - Unique occlusion handling capabilities for error-free motion tracking
  - Horizontal and vertical search for optimal motion estimation
  - Repetitive pattern artifact optimization
  - Programmable FRC “strength”
- LED backlight control with local dimming (FLI2515/FLI2520)
  - Reduces system power
  - Improves image contrast and black level performance
  - Analysis of regional image content performed to optimize regional LED backlight intensity
  - Local dimming backlight control for direct-lit 100/120 Hz panels (FLI2515) and 200/240 Hz (FLI2520) panels
  - Scanning backlight control for 100/120 Hz panels delivering a 200/240 Hz motion blur reduced “effect” (FLI2515)
  - Scanning backlight control for 200/240 Hz panels delivering a 400/480 Hz motion blur reduced “effect” (FLI2520)
  - Supports up to 32 horizontal by 16 vertical LED backlight zones (512 total zones)
  - Supports white and RGB LED direct-lit backlight systems
  - Flexible and programmable LED driver controller interface with 24 TTL inputs/outputs

- 3DTV/3D video
  - Supports 3D mandatory formats defined in HDMI 1.4a specification
  - Boosts the quality of 3D playback of the front-end SoC by increasing the frame rate per eye
  - Improved 3D handling with 120/240 Hz output (brighter 3D video and significantly less “ghosting” artifacts)
  - Integrates auto 2D to 3D video/text conversion and depth control

Table 2. 3D video formats supported

Input from front-end SoC	Output to TCON
720p @ 100/120 Hz (frame sequential)	1080p @ 100/120 Hz (frame sequential) (FLI2510/FLI2515) or 1080p @ 200/240 Hz (frame sequential) (FLI2520)
1080p @ 48 Hz (frame sequential)	
1080p @ 50/60 Hz (side-by-side half res)	
720p @ 50/60 Hz (top-bottom half res)	
1080p @ 50/60 Hz (top-bottom half res)	

- Main video scaling
  - Independent horizontal and vertical scaler engines
  - 8-tap horizontal scaler with Faroudja enhancer and programmable sharpness filter
  - 4-tap vertical scaler with Faroudja enhancer and programmable sharpness filter
  - Supports 30-bit YUV 444 or 30-bit RGB
- Graphics/PIP scaling
  - Independent horizontal and vertical scaler engines
  - 8-tap horizontal scaler with programmable sharpness filter
  - 4-tap vertical scaler with programmable sharpness filter
  - Supports 30-bit RGB/8-bit alpha
- Faroudja RealColor
  - Faroudja RealColor provides flexible programming, polar coordinate representation, and independent six-axis color control
  - Next generation ACC III/ACM-3D advanced color processing
  - Advanced Contrast Control delivers smoother, more realistic gradients and ensures that the full dynamic range is used in video content
  - Advanced Color Management with overlapping regions allows for flexible flesh-tone compensation, blue stretch, color regions detection, and other image enhancements
  - Proprietary QuickMatch technology produces uniform color responses for different panels using flexible and programmable techniques
- Faroudja TrueLife™ video enhancer
  - High performance programmable sharpening filters with noise coring
  - Programmable main channel horizontal and vertical filter coefficients
  - Non-linear chroma and luma enhancement

- DDR2/DDR3 memory controller
  - DDR2/DDR3 memory I/F support
  - Supports 32-bit memory I/F 1x16 + 1x16 – DDR1066 for 100/120 Hz applications with MCTi FRC (FLI2510) or 100/120 Hz applications with MCTi FRC and LED backlight control with local dimming and backlight scanning (FLI2515)
  - Supports 48-bit memory I/F 1x32 + 1x16 – DDR1066 for 200/240 Hz applications with MCTi FRC and LED backlight control with local dimming and backlight scanning (FLI2520)
  - Supports 256 Mb, 512 Mb, 1 Gb, and 2 Gb DRAM devices
- On-chip microprocessor
  - ST-40 system controller
  - Single/dual/quad SPI flash for stand-alone system boot
  - Integrated UARTs, I2C master/slaves, SPI master/slave, I2C slave to TT initiator, PWMs, and General Purpose Inputs/Outputs (GPIOs) for general purpose control and interface
- Output formats
  - Internal DisplayPort (iDP v1.0) transmitter drives 18/24/30-bpp for direct connection to 1080p @100/120 Hz LCD displays (FLI2510/FLI2515)
  - Dual Internal DisplayPort (iDP v1.0) transmitter drives 18/24/30-bpp for direct connection to 1080p @ 200/240 Hz LCD displays (FLI2520)
  - Quad (525 Mbps) LVDS transmitter drives 18/24/30-bpp for 100/120 Hz LCD displays (FLI2510/FLI2515)
  - Octal (525 Mbps) LVDS transmitter drives 18/24/30-bpp for 200/240 Hz LCD displays (FLI2520)

3 Application overview

Figure 1. FLI2510 and FLI75xx providing MCTi FRC (120 Hz)

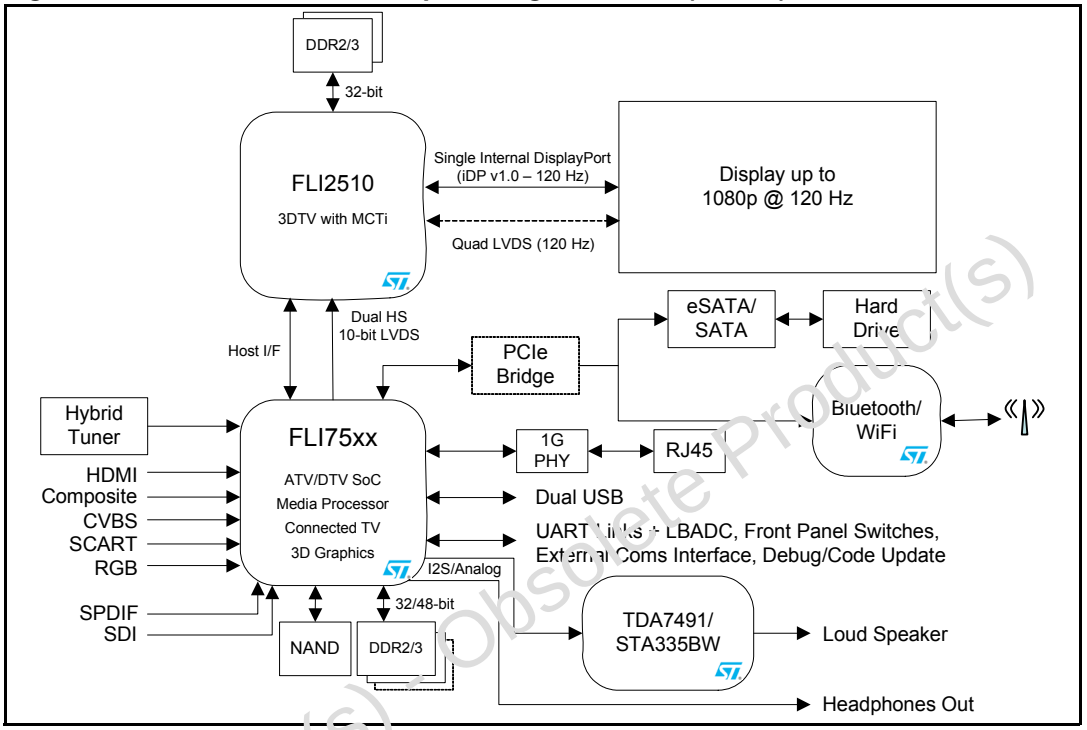


Figure 2. FLI2515 and FLI75xx providing MCTi FRC and LED backlight control with local dimming (120 Hz)

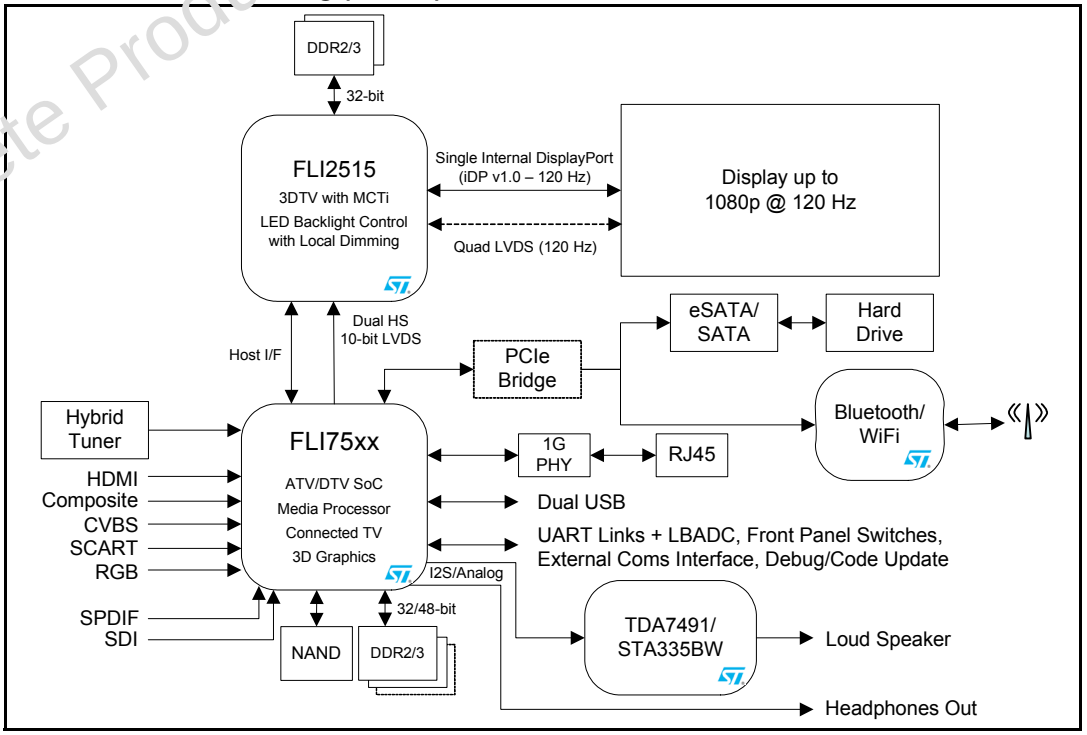
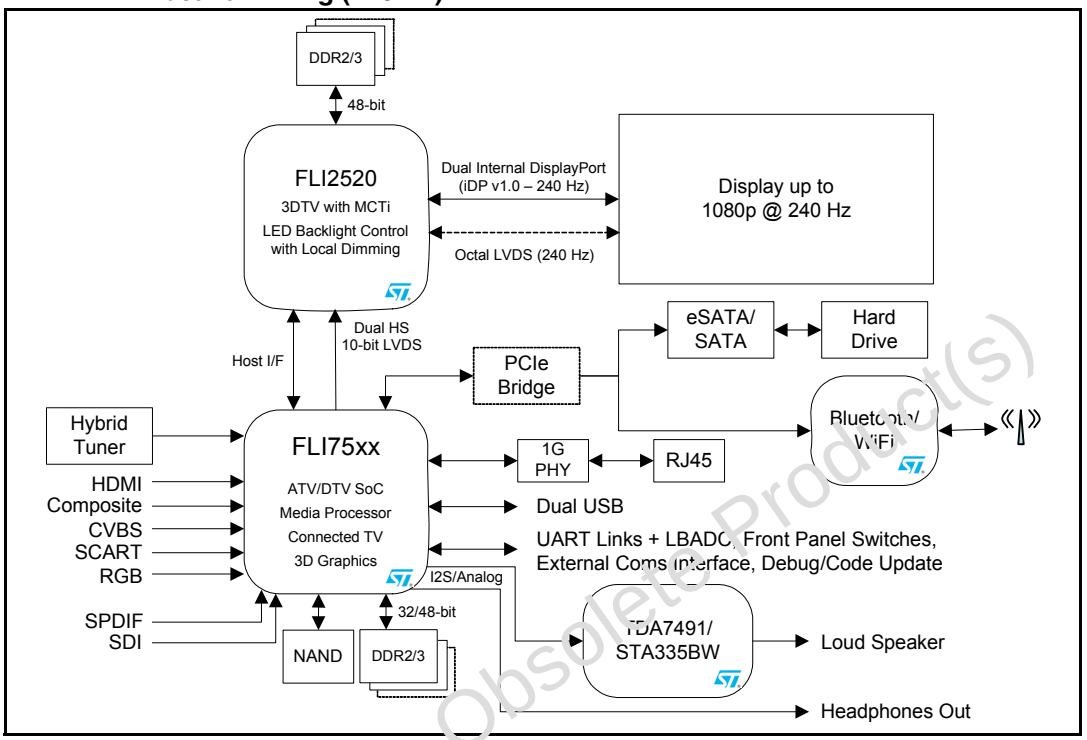


Figure 3. FLI2520 and FLI75xx providing MCTi FRC and LED backlight control with local dimming (240 Hz)



4 Ordering information

Table 3. Order codes

Part number	Description
FLI2510-AA	PBGA 35 x 35 mm
FLI2515-AA	PBGA 35 x 35 mm
FLI2520-AA	PBGA 35 x 35 mm

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5 Revision history

Table 4. Document revision history

Date	Revision	Changes
19-Aug-2010	1	Initial release.
23-Mar-2011	2	Corrected references to LVDS Tx speed.

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