

## Product Brief

### Highlights

- HDMI standard video and audio data conversion into a MIPI® Display Serial Interface (DSI) enables Application Processors with HDMI out to interface with MIPI DSI input display devices.
- Ideal for mobile and CE solutions with an LCD display requiring HDMI to MIPI DSI output.
- Support for common 3D formats and compatible protocols with the HDMI 1.4 standard.
- Support for up to 1920 x 1200 video resolution at refresh rates of 60 fps.
- Video de-interlacing and scaling.
- YCbCr to RGB and RGB to YCbCr format conversion.
- I<sup>2</sup>S and MIPI SLIMbus® audio support
- Applications include mobile tablets, digital still cameras, LCD displays, video projectors, head mount devices, game accessories and other integrated display panel applications with MIPI DSI interface.

# TC358779 Display Serial Interface Converter Chipset (HDMI to MIPI® DSI) with De-Interlacing, Scaling and Format Conversion

### Description

The Toshiba TC358779XBG is a High Definition Multimedia Interface (HDMI) to MIPI® Display Serial Interface (DSI) converter chipset with video de-interlacing, scaling and format conversion.

The TC358779XBG enables a Host processor with HDMI output to interface to a MIPI DSI interface display device, allowing HDMI video stream to be sent over a MIPI DSI standard output.

The Toshiba TC358779XBG bridge enables HDMI video stream output from an Application Processor to be converted to a format that can be processed as a MIPI DSI video stream. HDMI audio input is supported and can be transmitted over I<sup>2</sup>S or over a MIPI SLIMbus.

The maximum resolution supported is 1920 x 1200@24 bpp at a refresh rate of 60 fps limited by 4 Gbps MIPI DSI 1.11 standard bandwidth. The bridge supports common 3D video formats and protocols compatible with the HDMI 1.4 standard. The TC358779XBG supports a MIPI DSI interface to an LCD display panel with configurable 1, 2, 3, or 4 data lanes with lane speeds of up to 1 Gbps per lane.

The Toshiba TC358779XBG is an 80-pin device for non-HDI boards and with a small package size of 7.0 x 7.0 mm, 0.65 mm ball pitch and 1.0 mm maximum height.

### Features

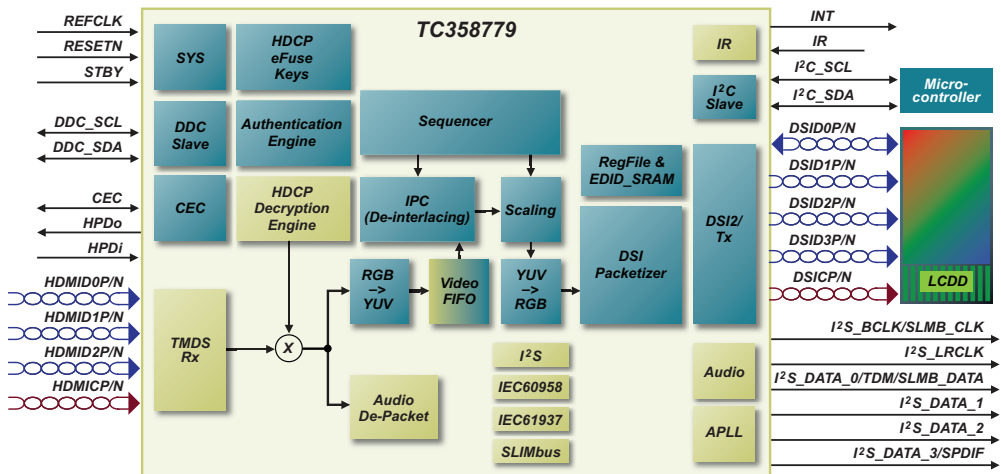
#### HDMI-RX Interface

- HDMI 1.4
  - Video formats supported (Up to 1920 x 1200@60 fps)
    - RGB, YCbCr 4:4:4 24-bpp@60 fps
    - YCbCr 4:2:2 24-bpp@60 fps
  - Audio support
    - Internal audio PLL to track N/CTS value transmitted by the ACR packet.
  - 3D support
  - HDCP 1.4 support
  - DDC support
  - EDID support
    - Release A, Revision 1
  - Maximum HDMI clock speed: 165MHz
- Does not support audio return path and HDMI Ethernet channels

#### DSI TX Interface

- MIPI DSI compliant (Version 1.1)
- Supports up to 4 data lanes@1 Gbps/lane
- Supports video data formats

### TC358779 Block Diagram



## Regional Sales Offices

### NORTHWEST

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### SOUTHWEST

Irvine, CA  
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Wixom, MI  
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### SOUTHEAST

Duluth, GA  
TEL: (770) 931-3363  
FAX: (770) 931-7602

— RGB888/666/565, YCbCr 4:2:2 and YCbCr 4:4:4

### I<sup>2</sup>C Slave Interface

- Support for normal (100KHz), fast mode (400 KHz), and ultra-fast mode (2MHz)

### Audio Output Interface

Any of the four audio interfaces are available: I<sup>2</sup>S, TDM, S/P-DIF or SLIMbus (pins are multiplexed)

- I<sup>2</sup>S Audio Interface
  - Up to 4 data lanes for 8-channel data
  - Support IEC 60958 & IEC 61937 (HBR support) digital audio formats
- TDM (Time Division Multiplexed) Audio Interface
  - Fixed to 8 channels
- S/P-DIF Audio Interface
  - Supports 2 channels (any 2 of the total 8)
- MIPI SLIMbus Audio Interface
  - Up to 8-channel data (2, 4, 6 or 8)

### Video Processing

- Input/Output formats supported:
  - RGB or YCbCr 4:2:2
  - Interlaced or Progressive
  - 2D or 3D
  - Supports up to 165 MHz PClk (up to 4 Gbps D-PHY bandwidth) including 640x480, 720x480, 720x576, 1280x720, 1920x1080 and 1920x1200 video resolutions
- Scaling:
  - Hardware performs scaling automatically based on input frame size and output

frame size

— Special handling of 3D formats: Frame packing, side by-side and top and bottom to avoid boundary artifacts.

- Color Space Conversion
  - RGB ⇔ YCbCr
  - Two sets of coefficients provided – 1 set for each direction
  - Both color space converters can be enabled/disabled independent of each other.

### Infrared (IR)

- Support NEC infrared (IR) protocol.

### System

- Internal core has two power domains (VDDC1 and VDDC2)
  - VDDC1 is “always-on” power domain
  - VDDC2, AVDD33, AVDD12, and VDD\_MIPI can be shut-off during deep sleep mode.
- Standby state is achieved by the assertion of STBY pin and removing core power supply (all the power supply without IOs\_1.8) externally.

### Power Supply Inputs

- Core and MIPI D-PHY: 1.2V
- I/O: 1.8V – 3.3V
- HDMI, audio and analog PLL: 3.3V

### Package

- Toshiba TC358779XBG package for non-HDI board:
  - 80-pin, 7.0 x 7.0 mm, 0.65 mm ball pitch and 1.0 mm maximum height

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