

GigaSTaR[®] DDL – Interfacing to DVI/LVDS and USB

Abstract

The GigaSTAR[®] Digital Display Link (DDL) is a powerful, serial long-distance multimedia link. Video, audio and digital sideband data are serialized and can be transmitted via standard STP cables up to 50 m; distances up to 550 m+ are possible with fiber cables.

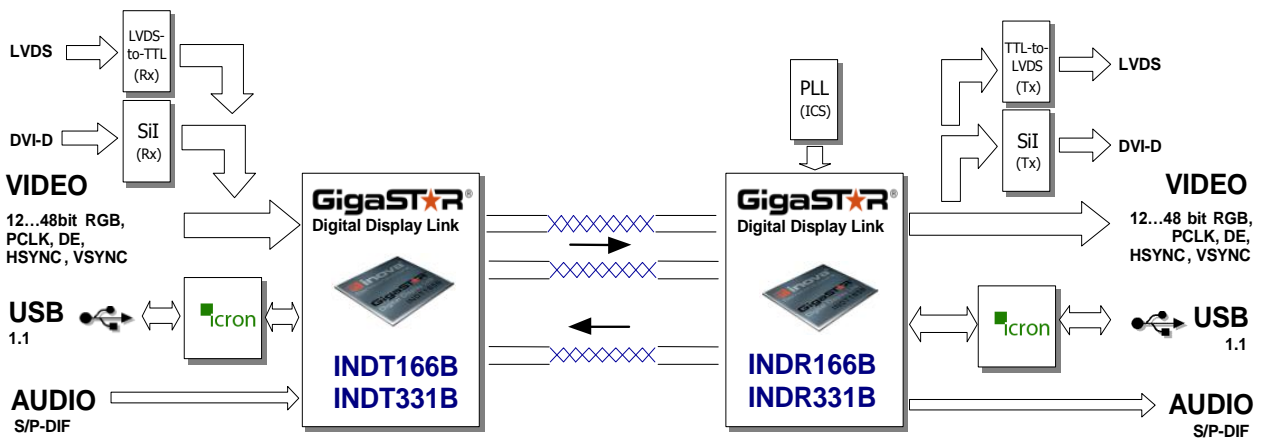


Figure 1.0 GigaSTaR Digital Display & Multimedia Link

1.0 Interfacing DVI / LVDS to DDL Transmitter

The DDL transmitter devices can be configured to interface with 18, 24, 36 or 48 bit pixel formats (half, full or double pixel single-ended). The pixel clock active edge can be set to rising, falling or both. The flexibility of the parallel interface allows an easy interfacing to popular LVDS/DVI-to-TTL translator devices as depicted Figure 2.1.

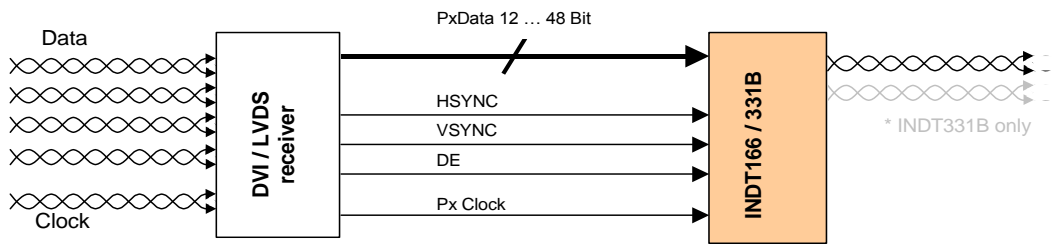


Figure 2.1 Interfacing LVDS or DVI to GigaSTAR[®] Digital Display Link Transmitter

2.0 Interfacing DDL Receiver to DVI / LVDS

DDL's flexible application interface can be configured to match all popular parallel video interfaces. The DDL receiver devices can be directly connected to all LVDS or DVI transmitter devices.

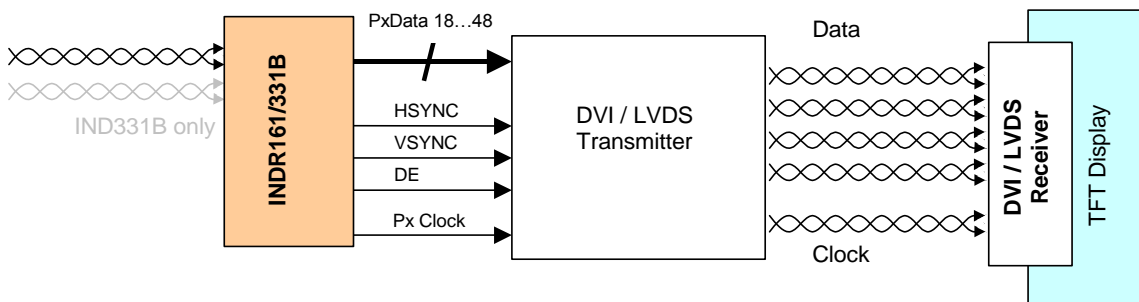


Figure 3.1 Interfacing DDL Receiver to LVDS / DVI Transmitter

3.0 Pixel Interface Mapping List (DDL to DVI / LVDS)

The following table provides information how to connect DDL IND166/331B to various DVI- and LVDS-Interface Chips:

DC90CF386 output pin 18 bpp	DC90CF386 output pin 24 bpp	SIL151/161 output pin 18 bpp	SIL151/161 output pin 24 bpp	INDT165/330B input pin	INDT165/330B output pin	SIL150/160 input pin 24 bpp	SIL150/160 input pin 18 bpp	DC90C385 input pin 24 bpp	DC90C385 input pin 18 bpp
-	RxOUT0	-	QE0	PX_D0	PX_D0	DIE0	-	TxIN0	-
-	RxOUT1	-	QE1	PX_D1	PX_D1	DIE1	-	TxIN1	-
RxOUT0	RxOUT2	QE2	QE2	PX_D2	PX_D2	DIE2	DIE2	TxIN2	TxIN0
RxOUT1	RxOUT3	QE3	QE3	PX_D3	PX_D3	DIE3	DIE3	TxIN3	TxIN1
RxOUT2	RxOUT4	QE4	QE4	PX_D4	PX_D4	DIE4	DIE4	TxIN4	TxIN2
RxOUT3	RxOUT6	QE5	QE5	PX_D5	PX_D5	DIE5	DIE5	TxIN6	TxIN3
RxOUT4	RxOUT27	QE6	QE6	PX_D6	PX_D6	DIE6	DIE6	TxIN27	TxIN4
RxOUT6	RxOUT5	QE7	QE7	PX_D7	PX_D7	DIE7	DIE7	TxIN5	TxIN6
-	RxOUT7	-	QE8	PX_D8	PX_D8	DIE8	-	TxIN7	-
-	RxOUT8	-	QE9	PX_D9	PX_D9	DIE9	-	TxIN8	-
RxOUT7	RxOUT9	QE10	QE10	PX_D10	PX_D10	DIE10	DIE10	TxIN9	TxIN7
RxOUT8	RxOUT12	QE11	QE11	PX_D11	PX_D11	DIE11	DIE11	TxIN12	TxIN8
RxOUT9	RxOUT13	QE12	QE12	PX_D12	PX_D12	DIE12	DIE12	TxIN13	TxIN9
RxOUT12	RxOUT14	QE13	QE13	PX_D13	PX_D13	DIE13	DIE13	TxIN14	TxIN12
RxOUT13	RxOUT10	QE14	QE14	PX_D14	PX_D14	DIE14	DIE14	TxIN10	TxIN13
RxOUT14	RxOUT11	QE15	QE15	PX_D15	PX_D15	DIE15	DIE15	TxIN11	TxIN14
-	RxOUT15	-	QE16	PX_D16	PX_D16	DIE16	-	TxIN15	-
-	RxOUT18	-	QE17	PX_D17	PX_D17	DIE17	-	TxIN18	-
RxOUT15	RxOUT19	QE18	QE18	PX_D18	PX_D18	DIE18	DIE18	TxIN19	TxIN15
RxOUT18	RxOUT20	QE19	QE19	PX_D19	PX_D19	DIE19	DIE19	TxIN20	TxIN18
RxOUT19	RxOUT21	QE20	QE20	PX_D20	PX_D20	DIE20	DIE20	TxIN21	TxIN19
RxOUT20	RxOUT22	QE21	QE21	PX_D21	PX_D21	DIE21	DIE21	TxIN22	TxIN20
RxOUT21	RxOUT16	QE22	QE22	PX_D22	PX_D22	DIE22	DIE22	TxIN16	TxIN21
RxOUT22	RxOUT17	QE23	QE23	PX_D23	PX_D23	DIE23	DIE23	TxIN17	TxIN22
RxOUT24	RxOUT24	HSYNC	HSYNC	PX_HSYNC	PX_HSYNC	HSYNC	HSYNC	TxIN24	TxIN25
RxOUT25	RxOUT25	VSYNC	VSYNC	PX_VSYNC	PX_VSYNC	VSYNC	VSYNC	TxIN25	TxIN26
RxOUT26	RxOUT26	DE	DE	PX_DE	PX_DE	DE	DE	TxIN26	TxIN27
RxCLKOUT	RxCLKOUT	ODCLK	ODCLK	PX_CLK+	PX_CLK+	IDCLK	IDCLK	TxCLKIN	TxCLKIN

Table 4.1 Connecting IND166/331B Devices to Standard DVI / LVDS devices for 24-/18-bit @ 1-pixel/clock

4.0 Interfacing USB 1.1 Extension to GigaSTaR® DDL Sideband Channels

Extending DVI and USB over a single cable!

Using INOVA SEMICONDUCTORS GigaSTaR® DDL link chips together with ICRON Technologies' patented ExtremeUSB® technology, USB 1.1 is no longer limited to the desktop range of 5 m, and can be extended together with DVI on a single cable for distances of up to 50 m over STP CAT5, or up to 550 m over fiber.

ICRON® is the global leader in extended range USB (Universal Serial Bus) connectivity solutions for industrial and commercial computer markets. ICRON's ExtremeUSB® technology is protected by patents and is the only extended range USB technology that has been approved by the USB Implementers Forum, the industry body that controls USB technology.

USB 1.1 Link extended through the GigaSTaR DDL sideband channels

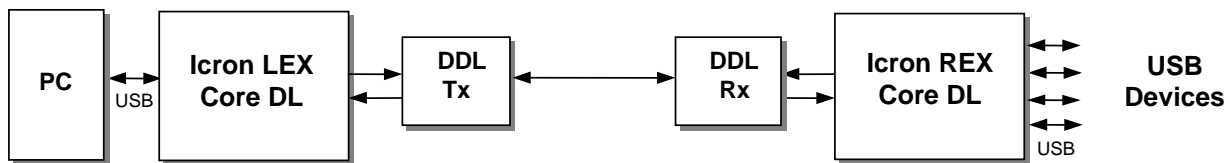


Figure 5.1 USB/DDL Block Diagram (System/Board Level)

Options to implement ExtremeUSB® extension through the GigSTaR sideband channels:

USB extension may be implemented simply and quickly with the ExtremeUSB 1.1 Core DL daughter-boards, or for greater mechanical flexibility and cost efficiency, a Design License is available to embed the components for Core DL into main boards of your design.

Implementation Option 1: ICRON ExtremeUSB 1.1 Core DL daughter-boards

Contact Icron for the ExtremeUSB 1.1 Core DL Product Specifications document 90-00051, which, in conjunction with the pin connections below, will provide the required information to mount the [Core DL](#) daughter-boards on your main boards and interface to the GigaSTaR DDL sideband channels.

Part # 10-00025

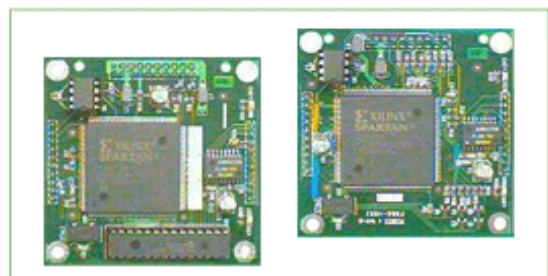
ExtremeUSB 1.1 Core DL LEX (Local Extender) module

Dimensions: 63.5mm x 63.5mm x 22.5mm (2.5" x 2.5" x 0.9")

Part #10-00026

ExtremeUSB 1.1 Core DL REX (Remote Extender) module

Dimensions: 63.5mm x 63.5mm x 22.5mm (2.5" x 2.5" x 0.9")



Pin Connections

Interfacing DDL TX Sideband Channel to ICRON ExtremeUSB 1.1 Core DL LEX daughter-board:

SB1_D[0]	→	Pin 3 J2
SB3_D[0]	→	Pin 7 J2
GND TX	→	Pin 5 J2

Interfacing DDL RX Sideband Channel to ICRON ExtremeUSB 1.1 Core DL REX daughter-board:

Pin 3 J2	→	SB3_D[0]
Pin 7 J2	→	SB1_D[0]
Pin 5 J2	→	GND RX

Implementation Option 2: ICRON ExtremeUSB 1.1 Design License Agreement (DLA)

With the DLA, it is possible to design your own extended range multimedia products from the ground up. The DLA facilitates a more compact design and lower production costs. The DLA provides the Object Code for the FPGA, full schematics, Engineering support agreement, and bills of material.

As a technical pre-requisite to the DLA, please contact Icron to order the ExtremeUSB 1.1 Core DL Developer Kit, and specify if your implementation is over copper or fiber. The Developer Kit includes LEX (Local Extender) and REX (Remote Extender) motherboards, LEX/REX Core DL daughter-boards, two power adapters and technical CD.

For more detailed information or to purchase ExtremeUSB Products or the Design License, please contact ICRON www.icron.com

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Digital Display Link

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