*TI Designs: TIDA-00137*

# *WVGA digital video SerDes for automotive TFT LCD Displays w/ DVP interface*

TEXAS INSTRUMENTS

## System Description

The design is a high speed serial video interface to connect a remote automotive WVGA TFT LCD display with DVP (LVCMOS) Interface to a video processing system. It uses TIs FPD-Link II SerDes technology to transmit uncompressed video data over shielded twisted pair cable. Application examples are rear seat entertainment systems, automotive clusters, Head Unit Display.

## Featured Applications

- Rear Seat Entertainment systems
- Automotive Clusters
- HUD Display
- Navigation Display r

## Design Resources

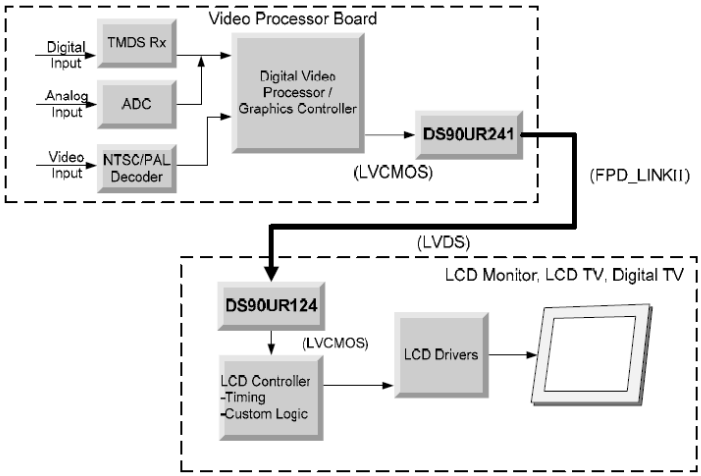
| | |
|---|---|
| DS90UR241-Q1 | Product Folder |
| EVM User's Guide | Document |
| DS90UR124-Q1 | Product Folder |

## Design Features

- Support s WVGA x 60 data rates
- Support DVP (LCMOS) Interface
- Built In Self-Test (BIST) ASIL B Applications

## Design Photo


## Block Diagram




**Jump start system design and speed time to market**

Comprehensive designs include schematics or block diagrams, BOMs, design files and test reports by experts with deep system and product knowledge. Designs span TI's portfolio of analog, embedded processor and connectivity products and supports a board range of applications including industrial, automotive, medical, consumer, and more. To explore the designs, go to http://www.ti.com/tidesigns

*TI Designs: TIDA-00137*

# *WVGA digital video SerDes for automotive TFT LCD Displays w/ DVP interface*

**Associated Part Numbers**

| Part Number | Part Description | EVM Link |
|---|---|---|
| DS90UR241-Q1 | 5-43MHz DC-Balanced 24-Bit FPD-Link II Serializer | EVM User's Guide |
| DS90UR124-Q1 | 5-43MHz DC-Balanced 24-Bit FPD-Link II Deserializer | N/A |

**Design Considerations:**
Connecting a remote dislay to e.g. an infotainment system requires data lines with sufficient bandwith and the capability to drive muntiple meters of cable in some cases. With fewer wires between the physical interface of the host and the display, FPD-Link II technology is an ideal, cost optimized solution for high speed, low power and low EMI (spread spectrum generation and low voltage differential signal) The serial bus scheme greatly eases system design by eliminating skew problems between clock and data.

**Quick Start Guide**

What's Needed:

1. One Serializer board with the DS90UR241
2. One De-serializer board with the DS90UR124
3. One 2-meter USB 2.0 Hi-SPEED cable assembly
4. Evaluation Kit Documentation (this manual)
5. DS90UR241/124 Datasheet

Before the system is powered up, please make sure all hardware is configured properly. Check that all jumpers and headers are connected appropriately. For a detailed description of configurations, see EVM user's guide.

1. A two (2) meter USB connector/cable assembly has been included in the kit. Connect 4-pin USB A side of cable harness to the serializer board and the other side 5-pin mini USB jack to the de-serializer board. This completes the LVDS interface connection.
   **NOTE: The DS90C241 and DS90C124 are NOT USB compliant and should not be plugged into a USB device nor should a USB device be plugged into the demo boards.**
2. Jumpers and switches have been configured at the factory; they should not require any changes for immediate operation of the chipset.
3. From the Video Decoder board, connect a flat cable (not supplied) to the Serializer board and connect another flat cable (not supplied) fromthe De-serializer board to the panel.
   Caution: The LVCMOS input levels should be within the specified range for optimal performance, not to exceed the absolute maximum rating of -0.3V to (VCC +0.3V).
   *Note: For 50 ohm LVCMOS input signal sources, add 50 ohm parallel termination resistors R1-R25 on the DS90UR241 Serializer board and provide appropriate 3.3V LVCMOS input signal levels into DIN[23:0] and TCLK.*
4. Power for the Tx and Rx boards must be supplied externally through Power Jack (VDD). Grounds for both boards are connected through Power Jack (VSS) .

## IMPORTANT NOTICE FOR TI REFERENCE DESIGNS

Texas Instruments Incorporated ("TI") reference designs are solely intended to assist designers (“Buyers”) who are developing systems that incorporate TI semiconductor products (also referred to herein as “components”). Buyer understands and agrees that Buyer remains responsible for using its independent analysis, evaluation and judgment in designing Buyer’s systems and products.

TI reference designs have been created using standard laboratory conditions and engineering practices. **TI has not conducted any testing other than that specifically described in the published documentation for a particular reference design.** TI may make corrections, enhancements, improvements and other changes to its reference designs.

Buyers are authorized to use TI reference designs with the TI component(s) identified in each particular reference design and to modify the reference design in the development of their end products. HOWEVER, NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE TO ANY OTHER TI INTELLECTUAL PROPERTY RIGHT, AND NO LICENSE TO ANY THIRD PARTY TECHNOLOGY OR INTELLECTUAL PROPERTY RIGHT, IS GRANTED HEREIN, including but not limited to any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI components or services are used. Information published by TI regarding third-party products or services does not constitute a license to use such products or services, or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

TI REFERENCE DESIGNS ARE PROVIDED "AS IS". TI MAKES NO WARRANTIES OR REPRESENTATIONS WITH REGARD TO THE REFERENCE DESIGNS OR USE OF THE REFERENCE DESIGNS, EXPRESS, IMPLIED OR STATUTORY, INCLUDING ACCURACY OR COMPLETENESS. TI DISCLAIMS ANY WARRANTY OF TITLE AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, QUIET ENJOYMENT, QUIET POSSESSION, AND NON-INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY RIGHTS WITH REGARD TO TI REFERENCE DESIGNS OR USE THEREOF. TI SHALL NOT BE LIABLE FOR AND SHALL NOT DEFEND OR INDEMNIFY BUYERS AGAINST ANY THIRD PARTY INFRINGEMENT CLAIM THAT RELATES TO OR IS BASED ON A COMBINATION OF COMPONENTS PROVIDED IN A TI REFERENCE DESIGN. IN NO EVENT SHALL TI BE LIABLE FOR ANY ACTUAL, SPECIAL, INCIDENTAL, CONSEQUENTIAL OR INDIRECT DAMAGES, HOWEVER CAUSED, ON ANY THEORY OF LIABILITY AND WHETHER OR NOT TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, ARISING IN ANY WAY OUT OF TI REFERENCE DESIGNS OR BUYER’S USE OF TI REFERENCE DESIGNS.

TI reserves the right to make corrections, enhancements, improvements and other changes to its semiconductor products and services per JESD46, latest issue, and to discontinue any product or service per JESD48, latest issue. Buyers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All semiconductor products are sold subject to TI’s terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its components to the specifications applicable at the time of sale, in accordance with the warranty in TI’s terms and conditions of sale of semiconductor products. Testing and other quality control techniques for TI components are used to the extent TI deems necessary to support this warranty. Except where mandated by applicable law, testing of all parameters of each component is not necessarily performed.

TI assumes no liability for applications assistance or the design of Buyers’ products. Buyers are responsible for their products and applications using TI components. To minimize the risks associated with Buyers’ products and applications, Buyers should provide adequate design and operating safeguards.

Reproduction of significant portions of TI information in TI data books, data sheets or reference designs is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Buyer acknowledges and agrees that it is solely responsible for compliance with all legal, regulatory and safety-related requirements concerning its products, and any use of TI components in its applications, notwithstanding any applications-related information or support that may be provided by TI. Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards that anticipate dangerous failures, monitor failures and their consequences, lessen the likelihood of dangerous failures and take appropriate remedial actions. Buyer will fully indemnify TI and its representatives against any damages arising out of the use of any TI components in Buyer’s safety-critical applications.

In some cases, TI components may be promoted specifically to facilitate safety-related applications. With such components, TI’s goal is to help enable customers to design and create their own end-product solutions that meet applicable functional safety standards and requirements. Nonetheless, such components are subject to these terms.

No TI components are authorized for use in FDA Class III (or similar life-critical medical equipment) unless authorized officers of the parties have executed an agreement specifically governing such use.

Only those TI components that TI has specifically designated as military grade or “enhanced plastic” are designed and intended for use in military/aerospace applications or environments. Buyer acknowledges and agrees that any military or aerospace use of TI components that have ***not*** been so designated is solely at Buyer's risk, and Buyer is solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI has specifically designated certain components as meeting ISO/TS16949 requirements, mainly for automotive use. In any case of use of non-designated products, TI will not be responsible for any failure to meet ISO/TS16949.

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265