DS90UB988-Q1 Automotive FPD-Link IV to OpenLDI Deserializer

1 Features

- OpenLDI (OLDI) transmitter
  - 2 Port OLDI output (Dual Pixel Link) up to 420MHz OLDI clock
  - Each Port supports 8MHz to 210MHz OLDI clock
  - Configurable 18-bit, 24-bit, 30-bit RGB
  - Stream synchronization and splitting
- FPD-Link IV interface
  - Up to 13.5/12.528/10.8/6.75/3.375Gbps per channel; Up to 27Gbps over dual channels
  - Coax/STP interconnect support
  - Selectable 1, 2 channels
  - Daisy-chain and splitting
  - Adaptive equalization
- Optional digital RGB parallel output interface supports 8MHz to 125MHz PCLK
- Ultra-low latency control channel
  - Two fast-mode plus I2C up to 1MHz (up to 3.4MHz for local bus access)
  - High-speed GPIOs
  - Supports SPI and UART pass-through GPIOs
- Backwards compatibility
  - 720p 92x and 1080p/2K 94x FPD-Link III product families
- Security and diagnostics
  - Link diagnostics
  - Voltage and temperature monitoring
  - BIST and pattern generation
  - CRC and error diagnostics
  - ECC on control bits
  - Unique ID for counterfeit protection
- Advanced link robustness and EMC control
  - Spread Spectrum Clocking Generation (SSCG)
  - Adaptive Receiver Equalization (AEQ)
- Low power operation
  - 1.8V and 1.15V dual power supply
- AEC-Q100 qualified for automotive applications
  - AEC-Q Grade-Level 2 , –40°C to 105°C
  - ISO 10605 and IEC 61000-4-2 ESD compliant

2 Applications

- Automotive Displays:
  - Central Information Displays (CID)
  - Rear Seat Entertainment (RSE)
  - Digital instrument clusters
  - Head units and HMI modules
  - Head Up Display (HUD)
  - Rear view and side mirror displays

3 Description

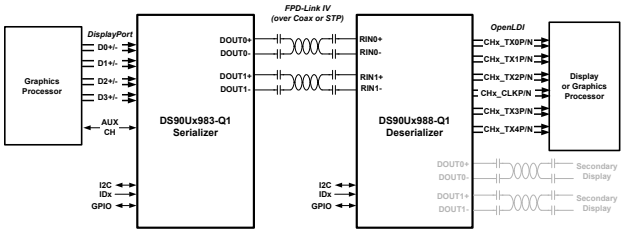
The DS90UB988-Q1 is an FPD-Link IV to OpenLDI bridge device. In conjunction with an FPD-Link IV serializer, the chipset receives a high-speed serialized interface over low-cost 50Ω coax or STP/STQ cables. The DS90UB988-Q1 supports OpenLDI (10 LVDS data lanes + 2 clocks) interface with video up to 420MHz PCLK. This provides a bridge between sources such as GPUs to connect to existing LVDS based displays or application processors.

The FPD-Link IV interface supports video and audio data transmission and full duplex control, including I2C, and GPIO data over the same link. Consolidation of video and control data over FPD-Link IV lanes reduces the interconnect size and weight and simplifies system design. EMI is minimized by the use of low voltage differential signaling, data scrambling, and randomization. In backward compatible FPD-Link III mode, the device supports up to 2K resolutions with 24-bit color depth over a single/dual link .

Package Information

PART NUMBER	PACKAGE (1)	PACKAGE SIZE(2)
DS90UB988-Q1	RUR (VQFNP, 88)	12mm × 12mm

(1) For all available packages, see Section 6.
(2) The package size (length × width) is a nominal value and includes pins, where applicable.



Applications Diagram

An IMPORTANT NOTICE at the end of this data sheet addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers. PRODUCTION DATA.

Table of Contents

1 Features....1
2 Applications....1
3 Description....1
4 Device and Documentation Support....3
4.1 Documentation Support....3
4.2 Community Resources....3
4.3 Trademarks....3
5 Revision History....3
6 Mechanical, Packaging, and Orderable Information....4

Copyright © 2024 Texas Instruments Incorporated

4 Device and Documentation Support

4.1 Documentation Support

4.1.1 Related Documentation

For related documentation see the following:

- Texas Instruments, *Soldering Specifications* application note
- Texas Instruments, *Semiconductor and IC Package Thermal Metrics* application note
- Texas Instruments, *Leadless Leadframe Package (LLP)* application note
- Texas Instruments, *LVDS Owner's Manual*
- Texas Instruments, *I2C Communication Over FPD-Link III with Bidirectional Control Channel* application note
- Texas Instruments, *Exploring the Internal Test Pattern Generation Feature of 720p FPD-Link III Devices* application note
- Texas Instruments, *I2C Bus Pullup Resistor Calculation* application note
- Texas Instruments FPD-Link Learning Center, *FPD-Link Fundamental Material* video series
- Texas Instruments, *Ten tips for successfully designing with automotive EMC/EMI requirements*
- Texas Instruments, *Serial Line-Fault Detection* (Contact TI)

4.2 Community Resources

4.3 Trademarks

All trademarks are the property of their respective owners.

5 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
February 2024	*	Initial Release

Copyright © 2024 Texas Instruments Incorporated

6 Mechanical, Packaging, and Orderable Information

The following pages include mechanical, packaging, and orderable information. This information is the most current data available for the designated devices. This data is subject to change without notice and revision of this document. For browser-based versions of this data sheet, refer to the left-hand navigation.

Copyright © 2024 Texas Instruments Incorporated

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package | Pins	Package qty | Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
DS90UB988RURRQ1	Active	Production	VQFNP (RUR) | 88	2500 | LARGE T&R	Yes	NIPDAUAG	Level-3-260C-168 HR	-40 to 105	UB988
DS90UB988RURRQ1.A	Active	Production	VQFNP (RUR) | 88	2500 | LARGE T&R	Yes	NIPDAUAG	Level-3-260C-168 HR	-40 to 105	UB988
DS90UB988RURTQ1	Active	Production	VQFNP (RUR) | 88	250 | SMALL T&R	Yes	NIPDAUAG	Level-3-260C-168 HR	-40 to 105	UB988
DS90UB988RURTQ1.A	Active	Production	VQFNP (RUR) | 88	250 | SMALL T&R	Yes	NIPDAUAG	Level-3-260C-168 HR	-40 to 105	UB988

(1) **Status:** For more details on status, see our product life cycle.

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the TI RoHS Statement for additional information and value definition.

(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

Important Information and Disclaimer: The information provided on this page represents TI's knowledge and belief as of the date that it is provided. TI bases its knowledge and belief on information provided by third parties, and makes no representation or warranty as to the accuracy of such information. Efforts are underway to better integrate information from third parties. TI has taken and continues to take reasonable steps to provide representative and accurate information but may not have conducted destructive testing or chemical analysis on incoming materials and chemicals. TI and TI suppliers consider certain information to be proprietary, and thus CAS numbers and other limited information may not be available for release.

In no event shall TI's liability arising out of such information exceed the total purchase price of the TI part(s) at issue in this document sold by TI to Customer on an annual basis.

GENERIC PACKAGE VIEW

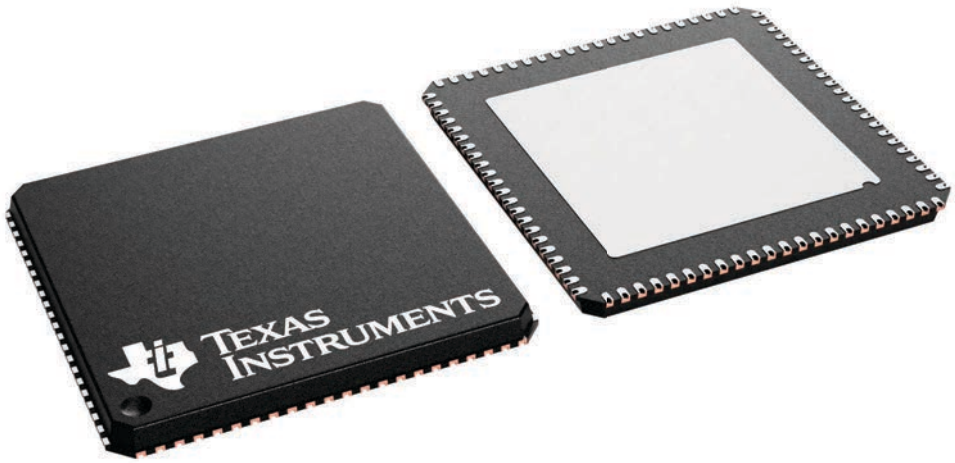
RUR 88

VQFN - 0.9 mm max height

12 x 12, 0.5 mm pitch

PLASTIC QUAD FLATPACK - NO LEAD

This image is a representation of the package family, actual package may vary.
Refer to the product data sheet for package details.



4228969/A

IMPORTANT NOTICE AND DISCLAIMER

TI PROVIDES TECHNICAL AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS AND IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for skilled developers designing with TI products. You are solely responsible for (1) selecting the appropriate TI products for your application, (2) designing, validating and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, regulatory or other requirements.

These resources are subject to change without notice. TI grants you permission to use these resources only for development of an application that uses the TI products described in the resource. Other reproduction and display of these resources is prohibited. No license is granted to any other TI intellectual property right or to any third party intellectual property right. TI disclaims responsibility for, and you fully indemnify TI and its representatives against any claims, damages, costs, losses, and liabilities arising out of your use of these resources.

TI’s products are provided subject to TI’s Terms of Sale, TI’s General Quality Guidelines, or other applicable terms available either on ti.com or provided in conjunction with such TI products. TI’s provision of these resources does not expand or otherwise alter TI’s applicable warranties or warranty disclaimers for TI products. Unless TI explicitly designates a product as custom or customer-specified, TI products are standard, catalog, general purpose devices.

TI objects to and rejects any additional or different terms you may propose.

Copyright © 2025, Texas Instruments Incorporated

Last updated 10/2025