TEXAS INSTRUMENTS
DS90UB988-Q1
ZHCSV33 – FEBRUARY 2024

DS90UB988-Q1 汽车级 FPD-Link IV 转 OpenLDI 解串器

1 特性

- OpenLDI (OLDI) 发送器
  - 2 端口 OLDI 输出（双像素链路）支持高达 420MHz 的 OLDI 时钟
  - 每个端口支持 8MHz 到 210MHz OLDI 时钟
  - 可配置 18 位、24 位或 30 位 RGB
  - 流同步和分离
- FPD-Link IV 接口
  - 每通道高达 13.5/12.528/10.8/6.75/3.375Gbps；双通道高达 27Gbps
  - 同轴/STP 互连支持
  - 可选 1 通道、2 通道
  - 菊花链和分离
  - 自适应均衡
- 可选数字 RGB 并行输出接口支持 8MHz 到 125MHz PCLK
- 超低延时控制通道
  - 两个快速+ 模式 I2C 高达 1MHz（本地总线访问高达 3.4MHz）
  - 高速 GPIO
  - 支持 SPI 和 UART 直通 GPIO
- 向后兼容性
  - 720p 92x 和 1080p/2K 94x FPD-Link III 产品系列
- 安全和诊断
  - 链路诊断
  - 电压和温度监测
  - BIST 和图形生成
  - CRC 和错误诊断
  - 控制位上具有 ECC
  - 用于防伪认证的唯一 ID
- 高级链路稳健性和 EMC 控制
  - 展频时钟生成 (SSCG)
  - 自适应接收器均衡 (AEQ)
- 低功耗运行
  - 1.8V 和 1.15V 双电源供电
- 符合面向汽车应用的 AEC-Q100 标准
  - AEC-Q 等级 2，–40°C 至 105°C
  - 符合 ISO 10605 和 IEC 61000-4-2 ESD 标准

2 应用

- 汽车显示器：
  - 中央信息显示屏 (CID)
  - 后座娱乐系统 (RSE)
  - 数字仪表组
  - 音响主机和 HMI 模块
  - 抬头显示 (HUD)
  - 后视显示器和侧后视镜显示器

3 说明

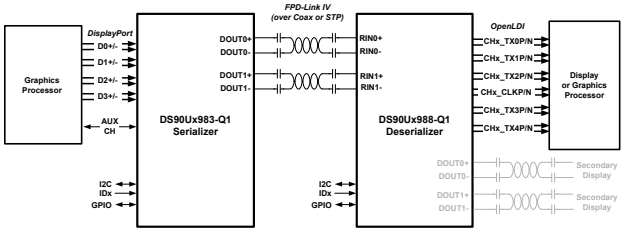
DS90UB988-Q1 是一款 FPD-Link IV 转 OpenLDI 桥接器件。该芯片组与 FPD-Link IV 串行器配合使用时，可通过低成本 50Ω 同轴电缆或 STP/STQ 电缆支持高速串行化接口。DS90UB988-Q1 支持 OpenLDI 接口（10 个 LVDS 数据通道 + 2 个时钟），可处理高达 420MHz PCLK 的视频信号。这为各种源（例如 GPU）之间提供了桥梁，便于源连接到现有 LVDS 显示器或应用处理器。

FPD-Link IV 接口支持通过同一链路进行视频和音频数据传输以及全双工控制（包括 I2C 和 GPIO 数据）。通过 FPD-Link IV 通道整合视频和控制数据可减少互连线数量和重量，并简化系统设计。通过使用低压差分信令、数据换序和随机生成更大限度地减少了电磁干扰 (EMI)。在向后兼容的 FPD-Link III 模式下，该器件在单/双链路上支持高达 2K 的分辨率和 24 位色深。

封装信息

器件型号	封装 (1)	封装尺寸(2)
DS90UB988-Q1	RUR（VQFNP，88）	12mm × 12mm

(1) 如需了解所有可用封装，请参阅节 6。
(2) 封装尺寸（长 × 宽）为标称值，并包括引脚（如适用）。



应用示意图

本资源的原文使用英文撰写。为方便起见，TI 提供了译文；由于翻译过程中可能使用了自动化工具，TI 不保证译文的准确性。为确认准确性，请务必访问 ti.com 参考最新的英文版本（控制文档）。

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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

所有商标均为其各自所有者的财产。

5 Revision History

注：以前版本的页码可能与当前版本的页码不同

DATE	REVISION	NOTES
February 2024	*	Initial Release

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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.

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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	Call TI | Nipdauag	Level-3-260C-168 HR	-40 to 105	UB988
DS90UB988RURRQ1.A	Active	Production	VQFNP (RUR) | 88	2500 | LARGE T&R	Yes	Call TI	Level-3-260C-168 HR	-40 to 105	UB988
DS90UB988RURTQ1	Active	Production	VQFNP (RUR) | 88	250 | SMALL T&R	Yes	Call TI | Nipdauag	Level-3-260C-168 HR	-40 to 105	UB988
DS90UB988RURTQ1.A	Active	Production	VQFNP (RUR) | 88	250 | SMALL T&R	Yes	Call TI	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.

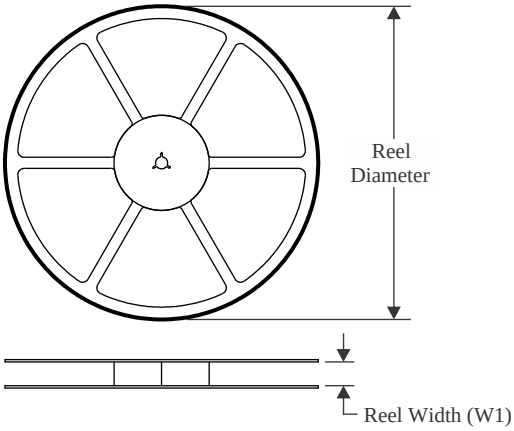
Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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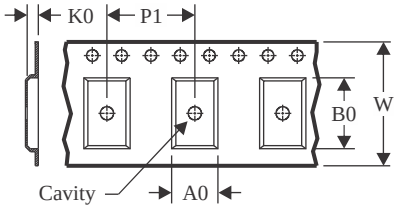
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TAPE AND REEL INFORMATION

REEL DIMENSIONS

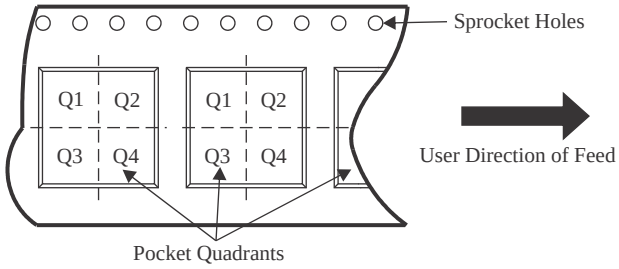


TAPE DIMENSIONS



A0	Dimension designed to accommodate the component width
B0	Dimension designed to accommodate the component length
K0	Dimension designed to accommodate the component thickness
W	Overall width of the carrier tape
P1	Pitch between successive cavity centers

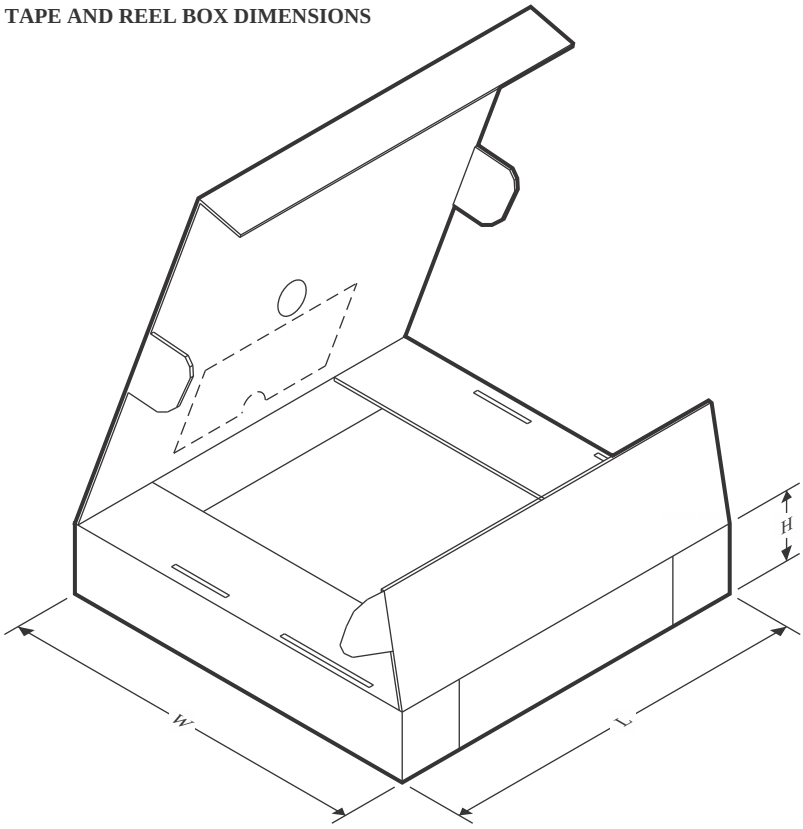
QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
DS90UB988RURRQ1	VQFNP	RUR	88	2500	330.0	24.4	12.3	12.3	1.1	16.0	24.0	Q2
DS90UB988RURTQ1	VQFNP	RUR	88	250	180.0	24.4	12.3	12.3	1.1	16.0	24.0	Q2

TAPE AND REEL BOX DIMENSIONS



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
DS90UB988RURRQ1	VQFNP	RUR	88	2500	367.0	367.0	35.0
DS90UB988RURTQ1	VQFNP	RUR	88	250	210.0	185.0	35.0

GENERIC PACKAGE VIEW

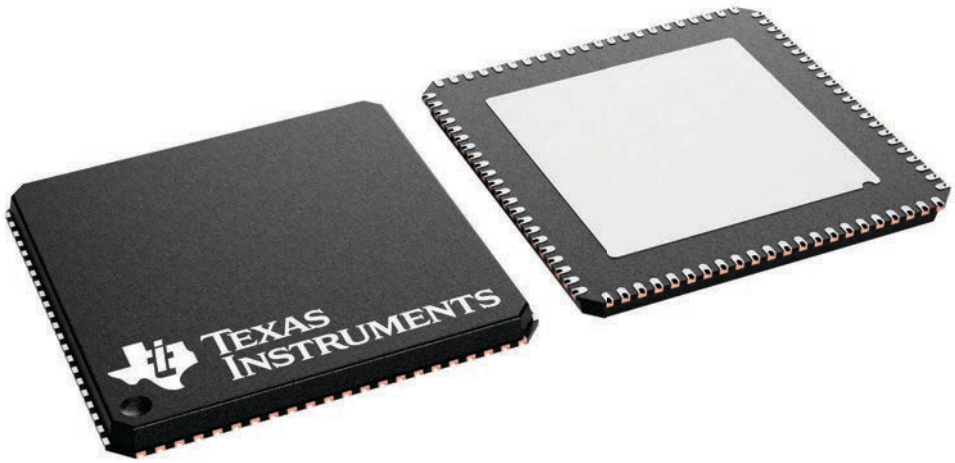
RUR 88

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.



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