

DS90UB984-Q1 4K FPD-Link IV 转嵌入式 DisplayPort 桥接解串器

1 特性

- DisplayPort (DP)/嵌入式 DisplayPort (eDP) 发送器
 - VESA DP v1.4a/eDP v1.4b 发送器
 - HBR3/HBR2/HBR/RBR 链路比特率
 - 主链路：1、2 或 4 通道
 - 每通道高达 8.1Gbps
 - 辅助通道 1Mbps
 - 热插拔检测 (HPD)
 - 将聚合视频流提取到本地 eDP 显示
 - 专为 4K (60Hz) 视频分辨率而设计
 - 流同步和分离
- FPD-Link IV 接口
 - 每通道 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
- 超低延迟控制通道
 - 两个高达 1MHz 快速+ 模式 I2C (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
 - 电压和温度监测
 - BIST 和图形生成
 - CRC 和错误诊断
 - 控制位上的 ECC
 - 用于防伪认证的唯一 ID
- 高级链路稳定性和 EMC 控制
 - 展频时钟生成 (SSCG)
 - 自适应接收器均衡 (AEQ)
- 低功耗操作
 - 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)
 - 数字仪表盘
 - 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

DS90UB984-Q1 是一款 FPD-Link IV 转 DisplayPort (DP)/嵌入式 DisplayPort (eDP) 桥接器件。该芯片组与 FPD-Link IV 串行器配合使用，可通过低成本 50Ω 同轴电缆或 STP/STQ 电缆提供高速串行化接口。DS90UB984-Q1 是一款 VESA DP v1.4a/eDP v1.4b 兼容器件，支持 HBR3 和超级帧格式等高级功能。该器件支持 4K 30 位颜色及更高的视频分辨率。FPD-Link IV 接口支持通过同一条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 通道实现视频数据和控制的整合可减小互连线尺寸和重量，并简化系统设计。通过使用低电压差分信号、数据换序和随机生成更大幅度地减少了电磁干扰 (EMI)。在向后兼容 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⁾
DS90UB984-Q1	RUR (VQFN, 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)。

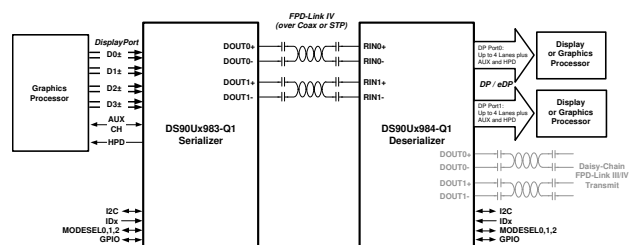


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4 Device and Documentation Support

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 支持资源

[TI E2E™ 中文支持论坛](#) 是工程师的重要参考资料，可直接从专家处获得快速、经过验证的解答和设计帮助。搜索现有解答或提出自己的问题，获得所需的快速设计帮助。

链接的内容由各个贡献者“按原样”提供。这些内容并不构成 TI 技术规范，并且不一定反映 TI 的观点；请参阅 TI 的 [使用条款](#)。

4.3 Trademarks

TI E2E™ is a trademark of Texas Instruments.

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4.4 静电放电警告



静电放电 (ESD) 会损坏这个集成电路。德州仪器 (TI) 建议通过适当的预防措施处理所有集成电路。如果不遵守正确的处理和安装程序，可能会损坏集成电路。

ESD 的损坏小至导致微小的性能降级，大至整个器件故障。精密的集成电路可能更容易受到损坏，这是因为非常细微的参数更改都可能会导致器件与其发布的规格不相符。

4.5 术语表

[TI 术语表](#) 本术语表列出并解释了术语、首字母缩略词和定义。

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

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.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead finish/ Ball material (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
DS90UB984RURRQ1	ACTIVE	VQFNP	RUR	88	2500	RoHS & Green	NIPDAUAG	Level-3-260C-168 HR	-40 to 105	UB984	Samples
DS90UB984RURRQ1	ACTIVE	VQFNP	RUR	88	250	RoHS & Green	NIPDAUAG	Level-3-260C-168 HR	-40 to 105	UB984	Samples

(1) The marketing status values are defined as follows:

ACTIVE: Product device recommended for new designs.

LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

PREVIEW: Device has been announced but is not in production. Samples may or may not be available.

OBSOLETE: TI has discontinued the production of the device.

(2) **RoHS:** TI defines "RoHS" to mean semiconductor products that are compliant with the current EU RoHS requirements for all 10 RoHS substances, including the requirement that RoHS substance do not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, "RoHS" products are suitable for use in specified lead-free processes. TI may reference these types of products as "Pb-Free".

RoHS Exempt: TI defines "RoHS Exempt" to mean products that contain lead but are compliant with EU RoHS pursuant to a specific EU RoHS exemption.

Green: TI defines "Green" to mean the content of Chlorine (Cl) and Bromine (Br) based flame retardants meet JS709B low halogen requirements of <=1000ppm threshold. Antimony trioxide based flame retardants must also meet the <=1000ppm threshold requirement.

(3) MSL, Peak Temp. - The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) There may be additional marking, which relates to the logo, the lot trace code information, or the environmental category on the device.

(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

(6) Lead finish/Ball material - Orderable Devices 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.

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TAPE AND REEL INFORMATION

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
DS90UB984RURRQ1	VQFNP	RUR	88	2500	330.0	24.4	12.3	12.3	1.1	16.0	24.0	Q2
DS90UB984RURQT1	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)
DS90UB984RURRQ1	VQFNP	RUR	88	2500	367.0	367.0	35.0
DS90UB984RURTQ1	VQFNP	RUR	88	250	210.0	185.0	35.0

GENERIC PACKAGE VIEW

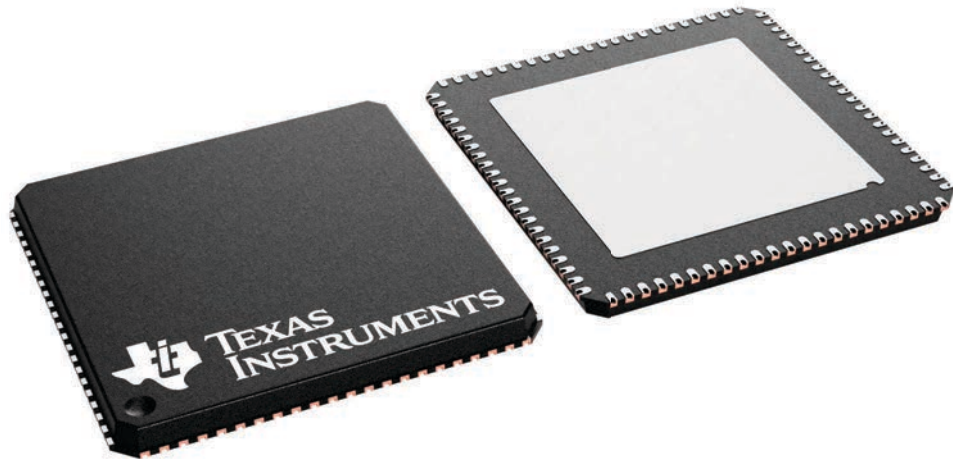
RUR 88

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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