

# DS90UH983-Q1 支持 HDCP 的 4K DisplayPort/eDP 转 FPD-Link IV 桥接串行器

## 1 特性

- DisplayPort 接收器
  - 兼容 DP/eDP v1.4
  - 支持数据通道交换和极性反转
  - 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)
  - 多显示器 (MST) 和 SST 支持
  - 支持对称和非对称 MST
  - 菊花链连接和分离
  - 超级帧解包功能
  - 适用于 4K (60Hz) 视频分辨率
- FPD-Link IV 接口
  - 支持每通道 13.5/12.528/10.8/6.75/3.375Gbps；双通道高达 27Gbps
  - 同轴/STP 互连支持
  - 端口拆分，以启用 Y 型电缆接口
  - 针对不同的 FPD 通道进行基于 MST 和超级帧的数据分离
- 超低延迟控制通道
  - 三个高达 1MHz 快速+ 模式 I<sup>2</sup>C (本地总线访问高达 3.4MHz)
  - 高速 GPIO
- 向后兼容性
  - IVI 94x 和 92x 产品系列
- 安全和诊断
  - 适用于 FPD-Link III、具有片上密钥的集成 HDCP v1.4
  - 链路诊断
  - 电压和温度监测
  - 线路故障检测
  - BIST 和图形生成
  - CRC 和错误诊断
  - 针对控制位的 ECC 纠错
  - 冗余副本模式
- 高级链路稳定性和 EMC 控制
  - 展频时钟 (SSC) 输入支持
  - 展频时钟生成 (SSCG)
  - 数据换序
- 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
  - 具有可湿性侧面的 64 引脚 9mm x 9mm QFN 封装

- 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)
  - 后视镜显示器和侧后视镜显示器

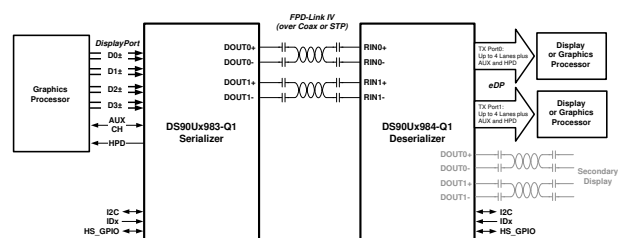
## 3 说明

DS90UH983-Q1 是一款 DisplayPort/eDP 转 FPD-Link III/FPD-Link IV 桥接器件。该芯片组与 FPD-Link IV 解串器配合使用，可通过低成本 50 Ω 同轴电缆或 STP 电缆提供高速串行化接口。DS90UH983-Q1 是一款 VESA DP 标准 v1.4 兼容器件，支持 MST、HBR3、和超级帧格式等高级功能。该器件能够支持高达 4K 视频分辨率和 30 位颜色。8b10b 编码 DP 数据被串行化为 FPD-Link IV 接口输出。FPD-Link IV 接口支持通过单通道或双通道进行视频和音频数据传输和全双工控制，包括 I<sup>2</sup>C 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、SSCG 和随机生成更大限度减少了 EMI。在向后兼容模式下，该器件通过单/双链路支持高达 720p 和 1080p 的分辨率以及 24 位色深，并且在与支持 HDCP 的解串器配合使用时支持 HDCP v1.4。

### 封装信息

器件型号	封装 <sup>(1)</sup>	封装尺寸 <sup>(2)</sup>
DS90UH983-Q1	RTD ( VQFN , 64 )	9mm × 9mm

- (1) 如需了解所有可用封装，请参阅数据表末尾的可订购产品附录。
- (2) 封装尺寸 (长 × 宽) 为标称值，并包括引脚 (如适用)。



简化版应用示意图



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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 接收文档更新通知

要接收文档更新通知，请导航至 [ti.com](#) 上的器件产品文件夹。点击 [通知](#) 进行注册，即可每周接收产品信息更改摘要。有关更改的详细信息，请查看任何已修订文档中包含的修订历史记录。

#### 4.3 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](#)。

#### 4.4 Trademarks

TI E2E™ is a trademark of Texas Instruments.

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#### 4.5 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。

#### 4.6 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
DS90UH983RTDRQ1	ACTIVE	VQFN	RTD	64	2000	RoHS & Green	NIPDAUAG	Level-3-260C-168 HR	-40 to 105	UH983	<a href="#">Samples</a>
DS90UH983RTDTQ1	ACTIVE	VQFN	RTD	64	250	RoHS & Green	Call TI   NIPDAUAG	Level-3-260C-168 HR	-40 to 105	UH983	<a href="#">Samples</a>

(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
DS90UH983RTDRQ1	VQFN	RTD	64	2000	330.0	16.4	9.3	9.3	1.1	12.0	16.0	Q2

**TAPE AND REEL BOX DIMENSIONS**


\*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
DS90UH983RTDRQ1	VQFN	RTD	64	2000	367.0	367.0	35.0



## GENERIC PACKAGE VIEW

RTD 64

VQFN - 0.9 mm max height

PLASTIC QUAD FLATPACK - NO LEAD



Images above are just a representation of the package family, actual package may vary.  
Refer to the product data sheet for package details.

4205146/D

## 重要声明和免责声明

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