

## DS90UB933-Q1 FPD-Link III Serializer for 1-MP/60-fps Cameras 10/12 Bits, 100 MHz

### 1 Features

- AEC-Q100 Qualified for Automotive Applications With the Following Results:
  - Device Temperature Grade 2: –40°C to +105°C Ambient Operating Temperature Range
- 37.5-MHz to 100-MHz Input Pixel Clock Support
- Coaxial or Single Differential Pair Interconnect
- Robust Power-Over-Coaxial (PoC) Operation
- Programmable Data Payload:
  - 10-Bit Payload up to 100 MHz
  - 12-Bit Payload up to 100 MHz
- Continuous Low Latency Bidirectional Control Interface Channel with I2C Support at 400 kHz
- Embedded Clock with DC-Balanced Coding to Support AC-Coupled Interconnects
- Capable of Driving up to 15-m Coaxial or Shielded Twisted-Pair Cables
- 4 Dedicated General Purpose Input (GPI)/ Output (GPO)
- 1.8-V, 2.8-V or 3.3-V-Compatible Parallel Inputs on Serializer
- Single Power Supply at 1.8 V
- ISO 10605 and IEC 61000-4-2 ESD Compliant

### 2 Applications

- Automotive
  - Surround View Systems (SVS)
  - Front Cameras (FC)
  - Rear View Cameras (RVC)
  - Sensor Fusion
  - Driver Monitor Cameras (DMS)
  - Remote Satellite RADAR Sensors
- Security and Surveillance
- Industrial Machine Vision

### 3 Description

The DS90UB933-Q1 device offers an FPD-Link III interface with a high-speed forward channel and a bidirectional control channel for data transmission over a single coaxial cable or differential pair. The DS90UB933-Q1 device incorporates differential signaling on both the high-speed forward channel and bidirectional control channel data paths. The serializer/deserializer pair is targeted for connections between imagers and video processors in an electronic control unit (ECU). This device is ideally suited for driving video data requiring up to 12-bit pixel depth plus two synchronization signals along with bidirectional control channel bus.

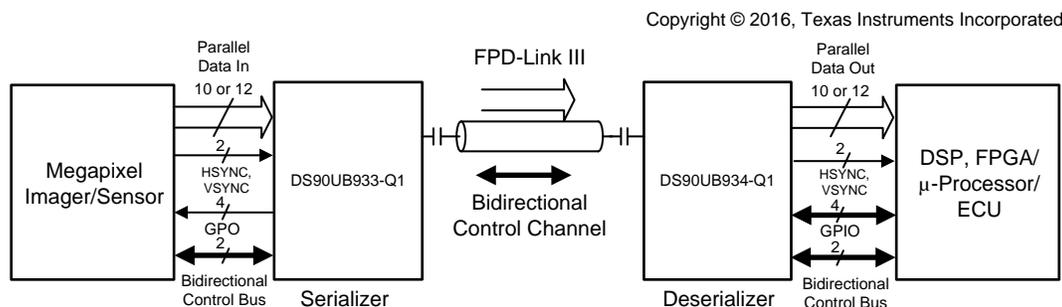
Using TI's embedded clock technology allows transparent full-duplex communication over a single differential pair, carrying asymmetrical-bidirectional control channel information. This single serial stream simplifies transferring a wide data bus over PCB traces and cable by eliminating the skew problems between parallel data and clock paths. This significantly saves system cost by narrowing data paths that in turn reduce PCB layers, cable width, and connector size and pins. Internal DC-balanced encoding/decoding is used to support AC-coupled interconnects.

**Table 1. Device Information<sup>(1)</sup>**

PART NUMBER	PACKAGE	BODY SIZE (NOM)
DS90UB933-Q1	WQFN (32)	5.00 mm x 5.00 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

**Figure 1. Simplified Schematic**



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## 4 Revision History

DATE	REVISION	NOTES
August 2016	*	Initial release.

PRODUCT PREVIEW

## 5 Device and Documentation Support

### 5.1 Documentation Support

#### 5.1.1 Related Documentation

For related documentation see the following:

- [Understanding the I2C Bus \(SLVA704\)](#)
- [I2C Bus Pullup Resistor Calculation \(SLVA689\)](#)
- [Soldering Specifications Application Report, SNOA549](#)
- [IC Package Thermal Metrics Application Report, SPRA953](#)
- [AN-1187 Leadless Leadframe Package \(LLP\) Application Report, SNOA401](#)
- [LVDS Owner's Manual, SNLA187](#)

### 5.2 Trademarks

All trademarks are the property of their respective owners.

### 5.3 Electrostatic Discharge Caution



These devices have limited built-in ESD protection. The leads should be shorted together or the device placed in conductive foam during storage or handling to prevent electrostatic damage to the MOS gates.

### 5.4 Glossary

[SLYZ022](#) — *TI Glossary*.

This glossary lists and explains terms, acronyms, and definitions.

## 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/Ball Finish (6)	MSL Peak Temp (3)	Op Temp (°C)	Device Marking (4/5)	Samples
DS90UB933TRTVRQ1	PREVIEW	WQFN	RTV	32	2500	Green (RoHS & no Sb/Br)	CU SN	Level-3-260C-168 HR	-40 to 105	UB933Q	
DS90UB933TRTVTQ1	PREVIEW	WQFN	RTV	32	250	Green (RoHS & no Sb/Br)	CU SN	Level-3-260C-168 HR	-40 to 105	UB933Q	

(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.

**OBSELETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(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.

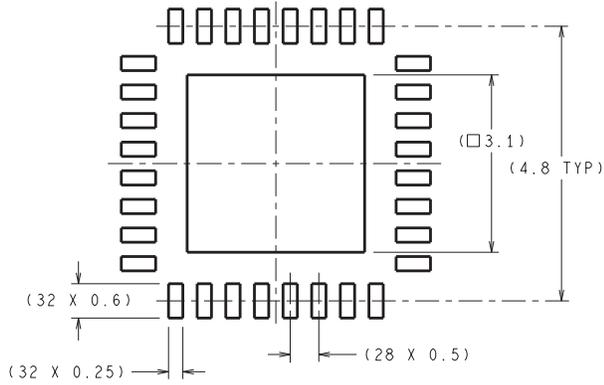
(5) Multiple Device Markings will be inside parentheses. Only one Device Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Device Marking for that device.

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

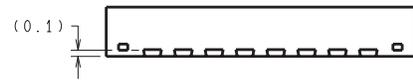
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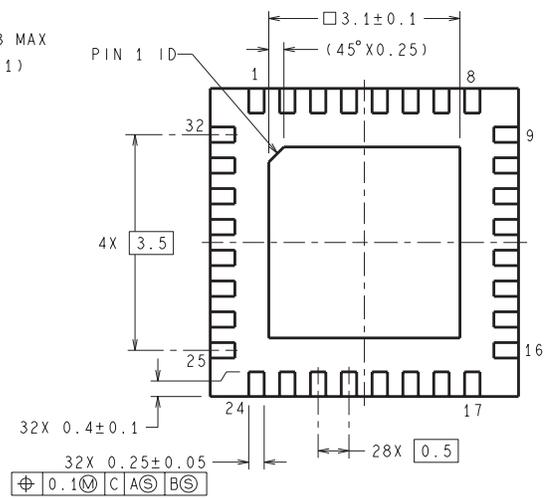
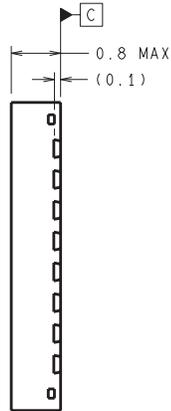
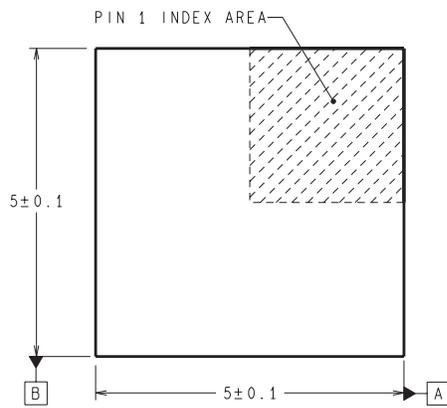
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SQA32A (Rev B)

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