

## 5 - 85 MHz 24-bit Color FPD-Link III Deserializer with HDCP

### General Description

The DS90UH926Q deserializer, in conjunction with the DS90UH925Q serializer, provides a solution for secure distribution of content-protected digital video within automotive entertainment systems. This chipset translates a parallel RGB Video Interface into a single pair high-speed serialized interface. The digital video data is protected using the industry standard HDCP copy protection scheme. The serial bus scheme, FPD-Link III, supports full duplex of high speed forward data transmission and low speed backchannel communication over a single differential link. Consolidation of video data and control over a single differential pair reduces the interconnect size and weight, while also eliminating skew issues and simplifying system design.

The DS90UH926Q deserializer recovers the RGB data, three video control signals and three I2S audio signals. It extracts the clock from a high speed serial stream. An output LOCK pin provides the link status if the incoming data stream is locked, without the use of a training sequence or special SYNC patterns, as well as a reference clock.

The DS90UH926Q deserializer has a 30-bit parallel LVCMOS output interface to accommodate the RGB, video control, and audio data.

An adaptive equalizer optimizes the maximum cable reach. EMI is minimized by the input SSC tolerance (SSCT), output SSC generation (SSCG) and enhanced progressive turn-on (EPTO) features.

The HDCP cipher engine is implemented in both the serializer and deserializer. HDCP keys are stored in on-chip memory.

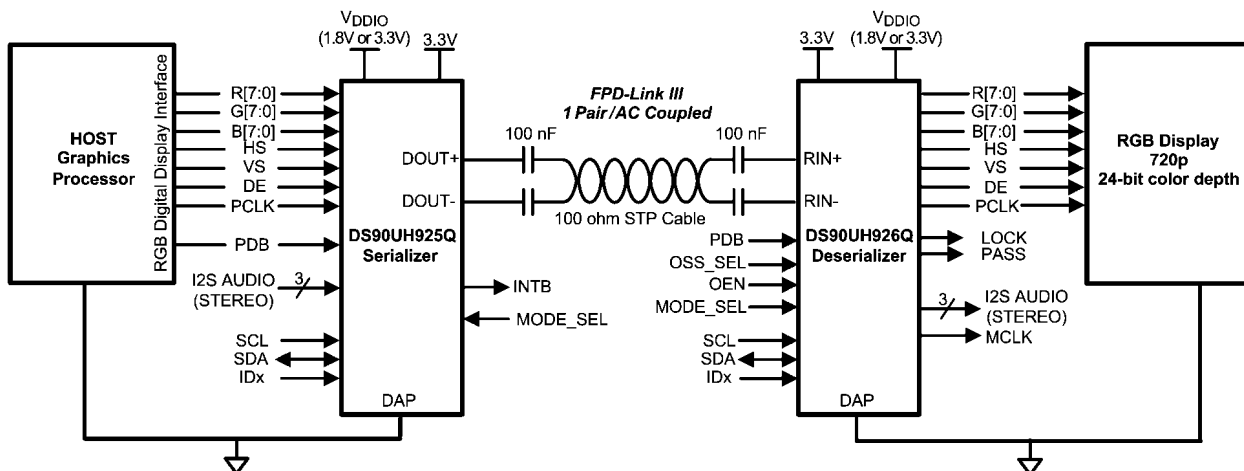
### Features

- Integrated HDCP cipher engine with on-chip key storage
- Bidirectional control interface channel with I2C compatible support (400 Kbps)
- Supporting high definition (720p) digital video format
- RGB888 + VS, HS, DE and I2S audio supported
- 5 to 85 MHz PCLK support
- Single 3.3V Operation with 1.8V or 3.3V compatible LVCMOS I/O interface
- AC Coupled STP Interconnect up to 10 meters
- Parallel LVCMOS video outputs
- I2C compatible serial control bus for configuration
- DC Scrambled & Balanced Data w/ Embedded Clock
- Adaptive cable equalization
- @ SPEED Link BIST Mode
- Low power modes minimize power dissipation
- EMI Minimization (SSCT, SSCG and EPTO)
- Automotive grade product: AEC-Q100 Grade 2 qualified
- >8kV HBM and ISO 10605 ESD rating
- Backward compatible modes

### Applications

- Automotive Display for Navigation
- Rear Seat Entertainment Systems

### Applications Diagram



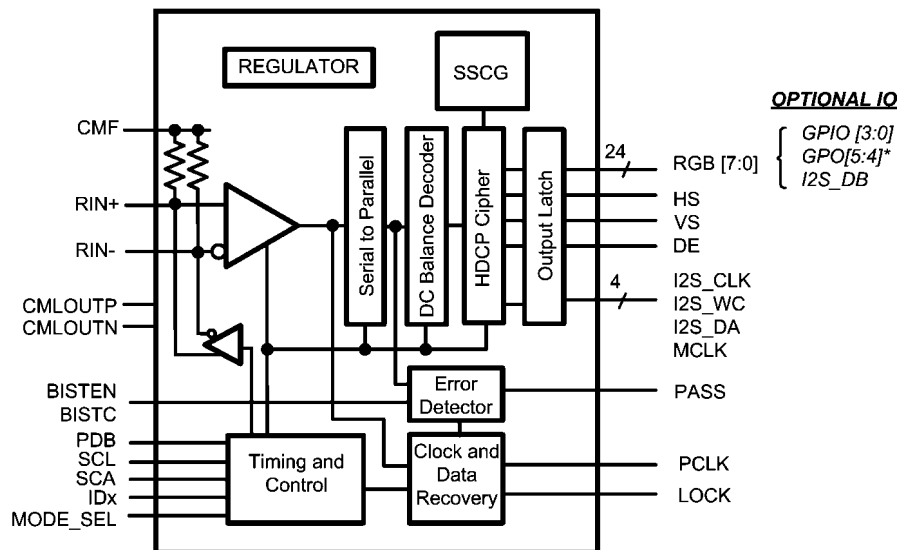
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## Block Diagram

The DS90UH926Q deserializer converts a serialized stream of information in FPD-Link III data format into video, audio, and I2C control data. This device is specifically designed for automotive environments. The device converts the serial

stream to parallel video, audio, and I2C control data, decrypts any HDCP protection, and then provides the data in an LVCMOS format to display and audio devices external to the chip. The device doesn't require any additional microcontroller support in the display to complete the HDCP decryption.



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## Application Information

The DS90UH925Q, in conjunction with the DS90UH926Q, is intended for interface between a HDCP compliant host (graphics processor) and a display. It supports a 24-bit color depth (RGB888) and high definition (720p) digital video format. It can receive a parallel RGB data with a pixel rate up to 85 MHz together with three control bits (VS, HS and DE) and three wire I2S-bus audio stream with an audio sampling rate up to 192 kHz. The included HDCP 1.3 compliant cipher block allows the authentication of the DS90UH926Q, which decrypts both video and audio contents. The keys are pre-loaded by National into Non-Volatile Memory (NVM) for maximum security.

## HDCP Licensing Information

FPD-Link III is a fully approved High-bandwidth Digital Content Protection (HDCP) technology licensed by the Digital Content Protection LLC (DCP LLC). HDCP is a technology to protect the content of digital media. HDCP technology is required to distribute Blu-ray media and other high definition protected media content. Per the terms of the HDCP license, the DS90UH925 & DS90UH926 parts can only be provided to customers that are HDCP license adopters with the DCP LLC. For more information on how to become an HDCP license adopter, please contact the DCP directly at <http://www.digital-cp.com/>.

## For More Information

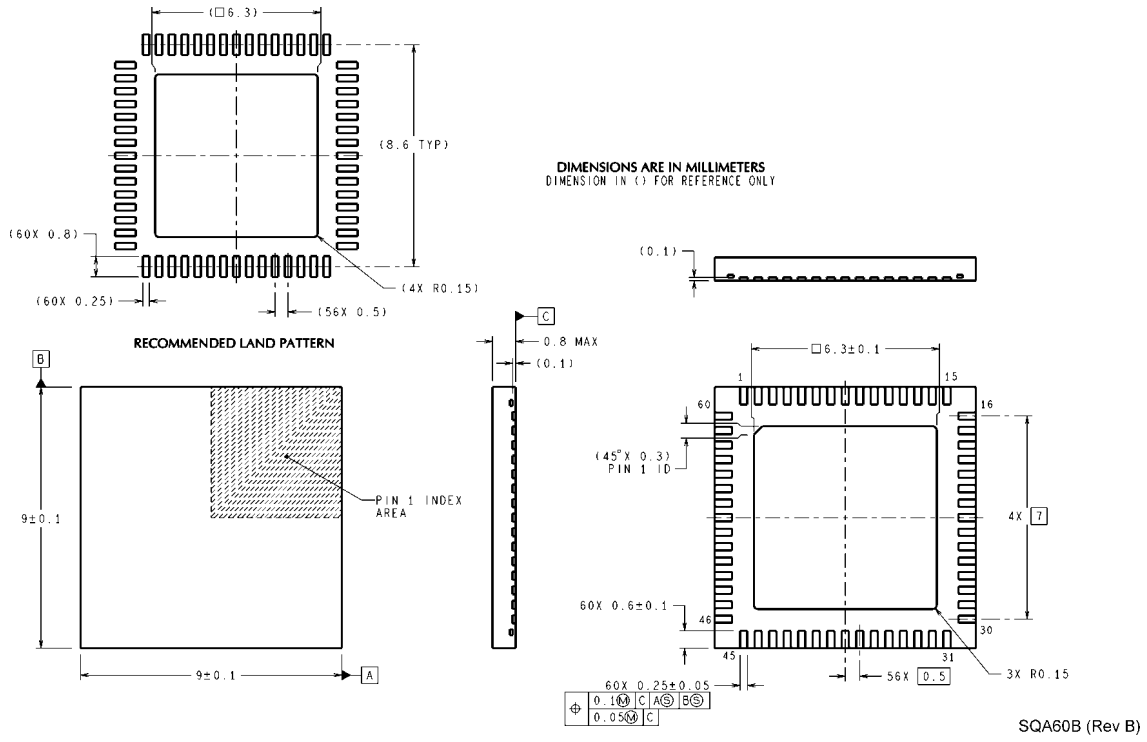
For detailed information and samples of these products please contact your National Semiconductor sales representative.

## Ordering Information

| NSID          | Package Description                          | Quantity | SPEC | Package ID |
|---------------|--|----------|------|------------|
| DS90UH926QSQE | 60-pin LLP, 9.0 X 9.0 X 0.8 mm, 0.5 mm pitch | 250      | NOPB | SQA60B     |
| DS90UH926QSQ  | 60-pin LLP, 9.0 X 9.0 X 0.8 mm, 0.5 mm pitch | 1000     | NOPB | SQA60B     |
| DS90UH926QSQX | 60-pin LLP, 9.0 X 9.0 X 0.8 mm, 0.5 mm pitch | 2500     | NOPB | SQA60B     |

Note: Automotive Grade (Q) product incorporates enhanced manufacturing and support processes for the automotive market, including defect detection methodologies. Reliability qualification is compliant with the requirements and temperature grades defined in the AEC Q100 standard. Automotive Grade products are identified with the letter Q. For more information go to <http://www.national.com/automotive>.

**Physical Dimensions** inches (millimeters) unless otherwise noted



## Notes

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| Clock and Timing               | <a href="http://www.national.com/timing">www.national.com/timing</a>         | Reference Designs            | <a href="http://www.national.com/refdesigns">www.national.com/refdesigns</a>       |
| Data Converters                | <a href="http://www.national.com/adc">www.national.com/adc</a>               | Samples                      | <a href="http://www.national.com/samples">www.national.com/samples</a>             |
| Interface                      | <a href="http://www.national.com/interface">www.national.com/interface</a>   | Eval Boards                  | <a href="http://www.national.com/evalboards">www.national.com/evalboards</a>       |
| LVDS                           | <a href="http://www.national.com/lvds">www.national.com/lvds</a>             | Packaging                    | <a href="http://www.national.com/packaging">www.national.com/packaging</a>         |
| Power Management               | <a href="http://www.national.com/power">www.national.com/power</a>           | Green Compliance             | <a href="http://www.national.com/quality/green">www.national.com/quality/green</a> |
| Switching Regulators           | <a href="http://www.national.com/switchers">www.national.com/switchers</a>   | Distributors                 | <a href="http://www.national.com/contacts">www.national.com/contacts</a>           |
| LDOs                           | <a href="http://www.national.com/lido">www.national.com/lido</a>             | Quality and Reliability      | <a href="http://www.national.com/quality">www.national.com/quality</a>             |
| LED Lighting                   | <a href="http://www.national.com/led">www.national.com/led</a>               | Feedback/Support             | <a href="http://www.national.com/feedback">www.national.com/feedback</a>           |
| Voltage References             | <a href="http://www.national.com/vref">www.national.com/vref</a>             | Design Made Easy             | <a href="http://www.national.com/easy">www.national.com/easy</a>                   |
| PowerWise® Solutions           | <a href="http://www.national.com/powerwise">www.national.com/powerwise</a>   | Applications & Markets       | <a href="http://www.national.com/solutions">www.national.com/solutions</a>         |
| Serial Digital Interface (SDI) | <a href="http://www.national.com/sdi">www.national.com/sdi</a>               | Mil/Aero                     | <a href="http://www.national.com/milaero">www.national.com/milaero</a>             |
| Temperature Sensors            | <a href="http://www.national.com/tempensors">www.national.com/tempensors</a> | SolarMagic™                  | <a href="http://www.national.com/solarmagic">www.national.com/solarmagic</a>       |
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