Excellent Design Solutions for USB 3.0 and Legacy 2.0 Applications

USB 3.0 (SuperSpeed™) achieves data transfer speeds that are up to 10 times faster than the previous version of the standard, enabling rapid and efficient transfers of data to and from external storage and multimedia devices.

USB is the most successful interface in the history of PCs with an installed base of 10+ billion units and growing at 3+ billion units per year. This success was brought about by the ease-of-use, interoperability and quality of USB-IF-certified devices. USB has always been an interface that makes adding peripherals to a PC as simple as hooking up a telephone to a wall-jack. Renesas played a key role in establishing the USB 3.0 ecosystem. For example, we have:

> Contributed to the USB 3.0 first draft and final specification
> Collaborated in developing and building the compliance test environment
> Provided the PCB for the USB-IF’s Peripheral Development Kit (PDK)
> Enabled the building of the USB 3.0 ecosystem by providing the world’s first IC implementation solutions!
> Facilitated designs that achieve more of USB 3.0’s SuperSpeed™ potential by offering USAP, hub and xHCI software

Renesas has led the industry by introducing the world’s first USB 3.0 host controller in May 2009, and the company’s lineup of USB 3.0 host controllers has been broadly adopted by customers worldwide, with total shipments already exceeding 60 million units.

Many devices selling in the marketplace today have already been tested with our host controllers!

Leading the Way Forward

Jan. ’96: USB 1.0
Renesas releases the world’s 1st OHCI Host

Apr. ’00: USB 2.0
Renesas releases world’s 1st USB 2.0 Host

May ‘05: WUSB
Renesas releases world’s 1st WHC/DWA

Jun. 2009: USB 3.0
Renesas releases the world’s 1st USB 3.0 Host controller

Renesas’ energy-efficient USB devices enable designers of today’s Smart Society products to create power-efficient products that maximize battery life and help to preserve our world’s valuable energy resources.

Offering a Complete Line of USB Hardware/Software Solutions for USB Applications

This Quick Guide provides an overview of the latest Renesas USB Host controllers, Hub controllers and USB-to-SATA bridge controllers, as well as associated software and support products such as USAP, hub and xHCI software. Although products for applying USB 3.0 technology are emphasized, devices for USB 2.0 implementations are also covered.
Overview: USB 2.0 vs. USB 3.0

Transferring Large Files quickly: USB 3.0 (SuperSpeed™) technology

Super Fast File Transfer Rate

> 10X faster than USB 2.0 (480Mbps vs. 5Gbps)
> 25Gbytes can transfer in 70 seconds versus 14 minutes with USB 2.0
> Faster Sync-and-Go

<table>
<thead>
<tr>
<th>Typical File Sizes</th>
<th>1GB</th>
<th>6GB</th>
<th>16GB</th>
<th>25GB</th>
</tr>
</thead>
<tbody>
<tr>
<td>USB 1.1</td>
<td>22 mins.</td>
<td>2.2 hours</td>
<td>5.9 hours</td>
<td>9.3 hours</td>
</tr>
<tr>
<td>USB 2.0</td>
<td>33 secs.</td>
<td>3.3 mins.</td>
<td>8.9 mins.</td>
<td>14 mins.</td>
</tr>
<tr>
<td>USB 3.0</td>
<td>3 secs.</td>
<td>20 secs.</td>
<td>53 secs.</td>
<td>70 secs.</td>
</tr>
</tbody>
</table>

Enables uncompressed 1080p video over USB

> Enhanced power management for maximum power savings
> 1/3 the power consumption of USB 2.0 for moving a given amount of data!
> Interrupt driven, non-polling architecture

Quick Charging for Mobile Platforms

> More power at the connector (4.5W vs. 2.5W)
> USB 3.0: 4.5 watts (900mA)
> USB 2.0: 2.5 watts (500mA)

Backwards Compatible with USB 2.0

USB 3.0 power management

USB 3.0 supports a new power management architecture and detailed management of the PHY and clock system. In USB 2.0, there are two states: ACTIVE and SUSPEND. By contrast, USB 3.0 has two additional low-power states, called U1 and U2, which differ in the amount of power saved and the time each takes to return to the ACTIVE state.
USB 3.0 Host Controllers

Renesas μPD720201 and μPD720202 third-generation Universal Serial Bus 3.0 host controllers comply with the Universal Serial Bus 3.0 Specification (USB 3.0) and Intel’s eXtensible Host Controller Interface (xHCI). The μPD720201 supports up to four SuperSpeed™ USB 3.0 ports, and μPD720202 supports up to two Super-Speed USB 3.0 ports.

These devices use a PCI Express® Gen 2 system interface bus, which makes it easy to add multiple SuperSpeed ports to systems containing the PCI Express bus interface. When connected to USB 3.0-compliant peripherals, the μPD720201 and μPD720202 can transfer information at clock speeds of up to 5 Gbps. While these host controllers are fully compliant and backward-compatible with the previous-generation USB 2.0 standard, they support data transfer speeds up to ten times faster so transfers of large amounts of information are performed much faster and more efficiently.

**Target Systems**
- Desktop and laptop computers
- PCI Express card/Express card
- Digital TV, HDD recorder, STB

**Features of μPD720201/2 (3rd. Gen. USB 3.0 Host Controller)**

- **xHCI 1.0 Compliant**
  - Supports SuperSpeed™ Debug Port (Microsoft requirement by June, 2012)
  - Supports USB-IF Battery Charging Specification

- **Industry-leading level of performance & ultra low power consumption**
  - Optimizes operation of PCIe/USB for the best performance (380MB/s Read, 350MB/s Write)
  - Eliminates supply current during S3 (less than 10mW).

- **Small footprint**
  - 4 port: 68pin QFN (8mm X 8mm)
  - 2 port: 48pin QFN (7mm X 7mm)
  - Firmware is downloadable from BIOS, eliminating requirement for an external ROM (BOM cost savings!) when the uPD720201 or uPD720202 is mounted on the motherboard.

Support Materials:
- Product Brief
- Data Sheet
- User’s Manual
- Evaluation Boards: ET-D720201-014 (4-port) ET-D720202-014 (2-port)
- USB 3.0 PCB Design Guide
- Software Drivers for Windows®: XP, Vista, and 7.
- Linux Application Note
Key Features

Differences from second-generation μPD720200A
> Improved effective throughput
> Decreased power consumption
> Small package size

μPD720201K8-BAC-A features
> 4 USB downstream ports
> 68-pin QFN, 8mm x 8mm

μPD720202K8-BAA-A features
> 2 USB downstream ports
> 48-pin QFN, 7mm x 7mm

Common Features
> Universal Serial Bus 3.0 Specification Revision 1.0
> PCI Express Base Specification Revision 2.0
> Intel’s eXtensible Host Controller Interface (xHCI) Specification Revision 1.0
> PCI Express Card Electromechanical Specification Revision 2.0
> PCI Bus Power Management Interface Specification Revision 1.2
> USB Battery Charging Specification Revision 1.1

> USB legacy function
> Supports serial peripheral interface (SPI) type ROM for firmware
> Supports firmware download interface from system BIOS
> System clock: 24MHz crystal
> 3.3V and 1.05V power supply

Firmware download from system BIOS
Simplified layout cuts BOM cost!!

Microcontroller implementation allows Renesas to readily respond if implementation issues arise.

Design Idea
Eliminate PCIe-to-PCI Bridge Chips in Older Designs!
### Renesas USB 3.0 Host Controller Comparison

<table>
<thead>
<tr>
<th>Product Name</th>
<th>µPD720200</th>
<th>µPD720200A</th>
<th>µPD720201</th>
<th>µPD720202</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generation</strong></td>
<td>1st</td>
<td>2nd</td>
<td>3rd</td>
<td>3rd</td>
</tr>
<tr>
<td>USB Ports</td>
<td>2 Ports (SS/HS/FS/LS )</td>
<td></td>
<td>4 Ports (SS/HS/FS/LS )</td>
<td>2 Ports (SS/HS/FS/LS )</td>
</tr>
<tr>
<td>System I/F</td>
<td></td>
<td>PCI Express Gen2 x 1 Lane (5Gbps)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compliant Specs</td>
<td>USB 3.0 Rev. 1.0, PCI Express Rev. 2.0, and Intel xHCI Rev. 0.96</td>
<td></td>
<td>USB 3.0 Rev. 1.0, PCI Express Rev. 2.0, and Intel xHCI Rev. 1.00</td>
<td></td>
</tr>
<tr>
<td>SSCG</td>
<td>No</td>
<td></td>
<td>On chip</td>
<td></td>
</tr>
<tr>
<td>Debug Port</td>
<td>No</td>
<td></td>
<td>Supports in all ports</td>
<td></td>
</tr>
<tr>
<td>Battery charge</td>
<td>No</td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Performance (on Gen2)</td>
<td>Read: 300MB/s Write: 200MB/s</td>
<td></td>
<td>Read: 380MB/s Write: 350MB/s</td>
<td></td>
</tr>
<tr>
<td>Power Consumption</td>
<td>Sleep: 62mW No dev.: 405mW Normal: 688mW</td>
<td></td>
<td>Sleep: 46mW No dev.: 50mW Normal: 567mW</td>
<td>Sleep: 1.2mW No device attached: 12mW Normal: 490mW</td>
</tr>
<tr>
<td>VDD</td>
<td>3.3V +/-0.3V, 1.05V +/-5%</td>
<td></td>
<td>3.3V +/-0.3V, 1.05V +/-5%</td>
<td></td>
</tr>
<tr>
<td>Package</td>
<td>176pin FPBGA (10mm x 10mm) 0.65pitch</td>
<td></td>
<td>68pin QFN (8mm x 8mm)</td>
<td>48pin QFN (7mm x 7mm)</td>
</tr>
<tr>
<td>Certification</td>
<td>380000000, 380000013</td>
<td></td>
<td>380000036, 380000037</td>
<td></td>
</tr>
<tr>
<td>Schedule</td>
<td>MP = Now</td>
<td></td>
<td>MP = Now</td>
<td></td>
</tr>
</tbody>
</table>

### USB Software Products

Renesas' UASP, hub and xHCI software for Windows® XP, Windows® Vista and Windows® 7

*Note: Renesas UASP software is not downloadable from the Internet. It is available for license by Renesas to manufacturers of USB 3.0-to-SATA bridge device IC.*

#### Iteration of Software and Hardware

- **Application (File system, Messenger, etc.)**
  - Application Utilizing USB Device
  - Microsoft Supplied
  - Renesas UASP Device Class Driver
  - USB 3.0 Drivers
  - USB 3.0 Host Hardware

#### What is UASP?

UASP (USB Attached SCSI Protocol) is the newly defined USB mass storage class protocol that takes full advantage of USB 3.0’s new dual-simplex and stream-transfer features.

- Enables storage products to operate much faster by utilizing new, faster bandwidth
- Reduces the protocol overhead of BOT
- Supports SATA Native Command Queuing
- Processes multiple commands in parallel

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The newly defined UASP standard improves the performance of SuperSpeed (USB3.0) storage devices!
USB 3.0 Hub Controller

The µPD720210 is a 4-Port Universal Serial Bus 3.0 hub controller that complies with the Universal Serial Bus 3.0 Specification and is 100% compatible with Renesas’ industry-standard host controllers.

This device with the Universal Serial Bus (USB) Specification Revision 3.0 operates at up to 5 Gbps. It incorporates Renesas’ market-proven design expertise in USB 3.0 interface technologies and our market-proven USB 2.0 hub core. The chip is fully compatible with all prior versions of USB and 100% compatible with Renesas’ industry-standard USB 3.0 host controller. It comes in a small 76-pin QFN package and integrates several commonly required external components, making it ideally suited for applications with limited PCB space. In addition, the µPD720210 incorporates Renesas’ low-power technologies.

Features of the µPD720210 Hub Controller

Best compatibility

Offers maximum compatibility with Renesas’ host, which is the de facto standard USB3.0 host controller (more than 95% share)

Low power consumption for ecosystem

Reduces power consumption for energy Star® applications
Supports USB 2.0/USB 3.0 low-power management

Small footprint & low BOM cost

76-pin QFN (9mm X 9mm)
Clock signal out, eliminates need for additional Xtals in non-removable device applications
External ROM is optional for VID/PID and UUID (plan)
Internal voltage regulator (planned upgrade)

Support Materials:
Product Brief
Data Sheet
User’s Manual
Reference Design

Operating Condition | Power Consumption
---|---
Headless | 30mW
No USB Connections on Downstream Ports | 50mW
SuperSpeed Devices Attached U3 Power State x4 | 86mW
Device Attached x1 | 222mW
Operating x1 | 419mW
**Key Features of µPD720210 3rd Generation USB Hub Controller**

- Compliant with Universal Serial Bus 3.0 Specification Revision 1.0, which was released by USB Implementers Forum, Inc.
- Supports the following speed data rates: Low-speed (1.5Mbps) / Full-speed (12Mbps) / High-speed (480Mbps) / Super-speed (5Gbps)
- µPD720210 supports up to 4 downstream ports for all speeds
- Supports all USB compliant data transfer types: Control / Bulk / Interrupt / Isochronous transfer
- Supports USB3.0/2.0 power management
- Up to 4 configurable ports
- Supports individual or global over-current detection and individual or ganged power control
- Supports downstream port status with LED
- Supports non-removable devices by I/O pin configuration
- Supports clock output (24/12MHz) for non-removal device
- Low power consumption, suitable for Energy Start programs
- System clock: 24 MHz crystal
- Supports USB Battery Charging Specification Revision 1.2 and other portable devices
- Small and low-pin-count package with simple pin assignment for PCB layout
- Integrated voltage regulator and CLK-OUT to reduce total BOM cost
- Part Number
  µPD720210K8-BAF-A
- Package
  76-pin QFN (9 x 9 mm)
- Target Systems
  PCs, servers, docking stations, monitors, external hub boxes, keyboards, etc.
BOM Cost Reduction

Take-away point: Renesas' silicon has the lowest total BOM cost.

Summary of Renesas Bill of Materials Cost Reductions

<table>
<thead>
<tr>
<th></th>
<th>Competition</th>
<th>Renesas</th>
<th>Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0V to 3.3V Regulator</td>
<td>$0.08</td>
<td>$-</td>
<td>$0.08</td>
</tr>
<tr>
<td>1.0V SW Regulator</td>
<td>$0.15</td>
<td>$0.05</td>
<td>$0.10</td>
</tr>
<tr>
<td>Downstream External Crystal</td>
<td>$0.10</td>
<td>$-</td>
<td>$0.10</td>
</tr>
<tr>
<td>Battery Charging Communication IC</td>
<td>$1.40</td>
<td>$0.40</td>
<td>$1.00</td>
</tr>
<tr>
<td>Total</td>
<td>$1.73</td>
<td>$0.45</td>
<td>$1.28</td>
</tr>
</tbody>
</table>

Up to $1.28 BOM savings (4 charging ports)
Renesas’ Hub enables faster charging by supporting all mainstream charging modes!

Integrating these charging standards saves $0.35/port compared to ext. IC:

**Port Type**

- Standard Downstream Port (SDP)
- Charging Downstream Port (CDP)
- Dedicated Charging Port (DCP)
- Apple

Example of monitor application

Energy Star® power program requirements for PC monitors:

- Less than 1W (Tier-2) during sleep mode  
  (In future, requirement will drop to less than 0.5W)
- Renesas hub controller cuts off power consumption when Vbus is off

Typical circuit

No need to put power control circuit for monitoring Vbus.  
Our hub integrates Low Drop Out Voltage Regulator internally, eliminating the need for an external LDO Voltage Regulator.
**USB 3.0-to-SATA Bridge Controller**

The Renesas μPD720230 is a single-chip, USB 3.0-to-SATA3 bridge controller that complies with the Universal Serial Bus 3.0 (USB 3.0) Specification Revision 1.0 and the Serial ATA (SATA) Specification Revision 3.0.

The μPD720230 has a USB 3.0 physical layer (PHY) that supports the SuperSpeed (5Gbps) data transfer mode and a USB 2.0 PHY that supports HighSpeed (480Mbps) and FullSpeed (12Mbps) data transfer modes. Additionally, the device supports the USB Attached SCSI Protocol (UASP), which significantly speeds up the transfer of large volumes of data to and from USB storage devices.

**SATA Interface**

- SATA Gen3 (6Gbps), Gen2 (3Gbps), and Gen1 (1.5Gbps) support
- Host interface power management
- Multiple LUN support
- Backend RAID and port multiplier chip support

**Key Features**

**USB Interface**

- SuperSpeed (5Gbps), HighSpeed (480Mbps), FullSpeed (12Mbps) transport modes
- Mass-Storage Class, USB Attached SCSI Protocol (UASP) compliance
- Mass Storage Class, Bulk-Only Transport (BOT) compliance

**Features**

- Hot plug support
- Full ATA-8, 48-bit logical block address support for drives larger than 2TB
- Power management
  - USB 3.0 U1/U2/U3 state
  - USB 2.0 Suspend/LPM
- Security
  - IEEE1619 standard XTS- AES 128bit/256bit encryption
  - IEEE1667TM authentication mechanism
- Integrated 32bit RISC CPU

**Target Applications**

- External HDD/SDD
- Enclosure case

**Support Materials:**
- Product Brief
- Data Sheet
- User’s Manual
- Evaluation Board

**Ordering Information**

**Part Number**

- μPD720230K8-622-BAE-A

**Package**

- 48-pin QFN (6 x 6 mm)
## Part Number Guide to All Renesas USB Products

<table>
<thead>
<tr>
<th>Part Number</th>
<th>USB Version</th>
<th>Type</th>
<th>Ports</th>
<th>Temp.</th>
<th>Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>µPD720200AF1-DAP-A</td>
<td>USB 3.0</td>
<td>Host Controller</td>
<td>2-port</td>
<td>0 to +85°C</td>
<td>176-pin FPBGA (10 mm x 10 mm, 0.65mm pitch)</td>
</tr>
<tr>
<td>µPD720201K8-701-BAC-A</td>
<td>USB 3.0</td>
<td>Host Controller</td>
<td>4-port</td>
<td>0 to +85°C</td>
<td>68-pin QFN (8 mm x 8 mm, 0.4mm pitch)</td>
</tr>
<tr>
<td>µPD720201K8-711-BAC-A</td>
<td>USB 3.0</td>
<td>Host Controller</td>
<td>4-port</td>
<td>-40 to +85°C</td>
<td>68-pin QFN (8 mm x 8 mm, 0.4mm pitch)</td>
</tr>
<tr>
<td>µPD720202K8-701-BAA-A</td>
<td>USB 3.0</td>
<td>Host Controller</td>
<td>2-port</td>
<td>0 to +85°C</td>
<td>48-pin QFN (7 mm x 7 mm, 0.5mm pitch)</td>
</tr>
<tr>
<td>µPD720202K8-711-BAA-A</td>
<td>USB 3.0</td>
<td>Host Controller</td>
<td>2-port</td>
<td>-40 to +85°C</td>
<td>48-pin QFN (7 mm x 7 mm, 0.5mm pitch)</td>
</tr>
<tr>
<td>uPD720210K8-BAF-A</td>
<td>USB 3.0</td>
<td>Hub</td>
<td>4-port</td>
<td>0 to +70°C</td>
<td>76pin QFN (9 mm x 9 mm) (TBD: 3QCY2012)</td>
</tr>
<tr>
<td>µPD720202K8-BAA-A</td>
<td>USB 3.0</td>
<td>Host Controller</td>
<td>2-port</td>
<td>0 to +85°C</td>
<td>48-pin QFN (6mm x 6mm)</td>
</tr>
<tr>
<td>µPD720101GJ-UEN-A</td>
<td>USB 2.0</td>
<td>Host Controller</td>
<td>5-port</td>
<td>0 to +70°C</td>
<td>144-pin Plastic LQFP (Fine Pitch) (20 mm x 20 mm)</td>
</tr>
<tr>
<td>µPD720101F1-EA8-A</td>
<td>USB 2.0</td>
<td>Host Controller</td>
<td>5-port</td>
<td>0 to +70°C</td>
<td>144-pin Plastic FBGA (12 mm x 12 mm)</td>
</tr>
<tr>
<td>µPD720102GC-YEB-A</td>
<td>USB 2.0</td>
<td>Host Controller</td>
<td>3-port</td>
<td>-20 to +70°C</td>
<td>120-pin Plastic TQFP (Fine Pitch) (14 mm x 14 mm)</td>
</tr>
<tr>
<td>µPD720102F1-CA7-A</td>
<td>USB 2.0</td>
<td>Host Controller</td>
<td>3-port</td>
<td>-20 to +70°C</td>
<td>121-pin Plastic FBGA (8 mm x 8 mm)</td>
</tr>
<tr>
<td>µPD720113GK-9EU-A</td>
<td>USB 2.0</td>
<td>Hub</td>
<td>7-port</td>
<td>0 to +70°C</td>
<td>80-pin Plastic TQFP (12 mm x 8 mm)</td>
</tr>
<tr>
<td>µPD720114GA-YEU-A</td>
<td>USB 2.0</td>
<td>Hub</td>
<td>4-port</td>
<td>0 to +85°C</td>
<td>48-pin Plastic TQFP (7 mm x 7 mm)</td>
</tr>
<tr>
<td>µPD720114K9-4E4-A</td>
<td>USB 2.0</td>
<td>Hub</td>
<td>4-port</td>
<td>0 to +85°C</td>
<td>40-pin Plastic QFN (6 mm x 6 mm)</td>
</tr>
<tr>
<td>R8A66597FP#RF1S</td>
<td>USB 2.0</td>
<td>Host Controller</td>
<td>2-port</td>
<td>-20 to +85°C</td>
<td>80-pin LQFP (10 mm x 10 mm, 0.4 mm pitch) (Tray)</td>
</tr>
<tr>
<td>R8A66597DFP#RB1S</td>
<td>USB 2.0</td>
<td>Host Controller</td>
<td>2-port</td>
<td>-40 to +85°C</td>
<td>80-pin LQFP (10 mm x 10 mm, 0.4 mm pitch) (Tray)</td>
</tr>
<tr>
<td>R8A66597BG#DF1S</td>
<td>USB 2.0</td>
<td>Host Controller</td>
<td>2-port</td>
<td>-20 to +85°C</td>
<td>81-pin FBGA (5 mm x 5 mm, 0.5 mm pitch) (Tape and Reel)</td>
</tr>
</tbody>
</table>

### Typical Applications for USB Devices

<table>
<thead>
<tr>
<th>Application</th>
<th>Host</th>
<th>Hub</th>
<th>SATA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Speed up File Transfer</strong></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>NASs</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>PCs</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Servers</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Tablets (Netbook/top)</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Extension of Interfaces</strong></td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Docking Stations</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Monitors</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Motherboards</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Single Board Computers</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Note: Requires PCIe</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>(Gen 1 or 2 and Linux for Host Controller)</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Add-in Cards</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hub-Boxes</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PVR</strong></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Set-top boxes</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Home-Gateway</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td><strong>External Storage</strong></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Hard and Solid State Disk Drives</td>
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USB website and technical support

Quick links to USB 3.0 and 2.0 product documentation:
http://am.renesas.com/prod/usb/

USB Technical Support
USB.Help@dm.renesas.com
(This email alias is covered by a team of USB technical experts within our engineering group.)