# S1F77310M0A

EPSON
EXCEED YOUR VISION

## Power Bus Switch IC
## 1 to 1 Bus Switch

## ■ OVERVIEW

The S1F77310 series is the bus switch suitable for USB applications. The adopted CMOS process technology characterizes the S1F77310 series by low power consumption. The compact PLP-8 adopted for the package enables the S1F77310 series to be mounted on high-density assemblies.
The built-in level shift circuit eliminates the need of external level shift circuitry for the input to this IC.

## ■ FEATURES

- Input voltage range : 3.0V to 3.6V
- Low-current consumption : 14μA (MAX)
- Stand-by current : 1μA (MAX)
- Bus switch ON resistance : 5.3Ω (typ)
- Bus switch OFF capacitance : 1.7pF (typ)

## ■ APPLICATION

- Mobile communication equipment (mobile phones, cordless phones, and wireless communication devices)
- Mobile AV equipment
- Home appliances
- Cameras, and video equipment
- Portable game devices
- Battery equipment

## ■ PACKAGE

- PLP-8 (1.60 mm x 1.60 mm)

## ■ APPLICATION CIRCUIT EXAMPLE

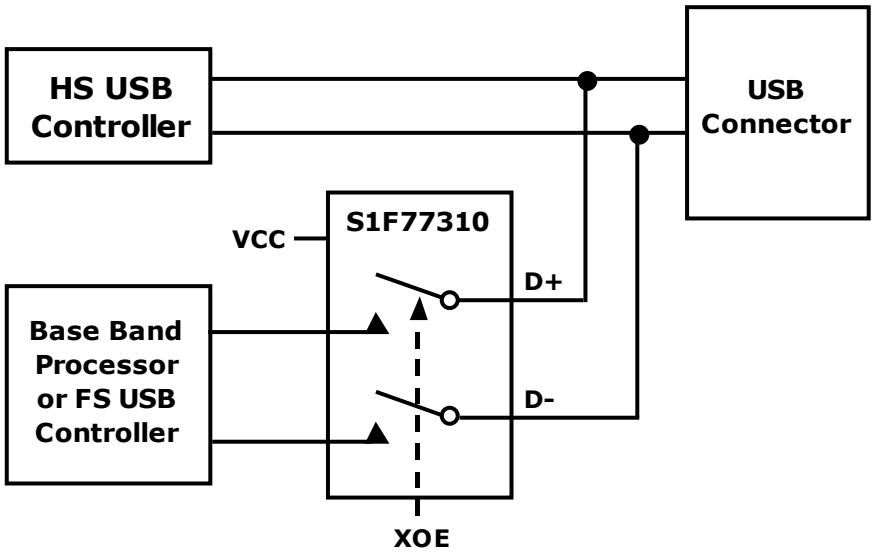
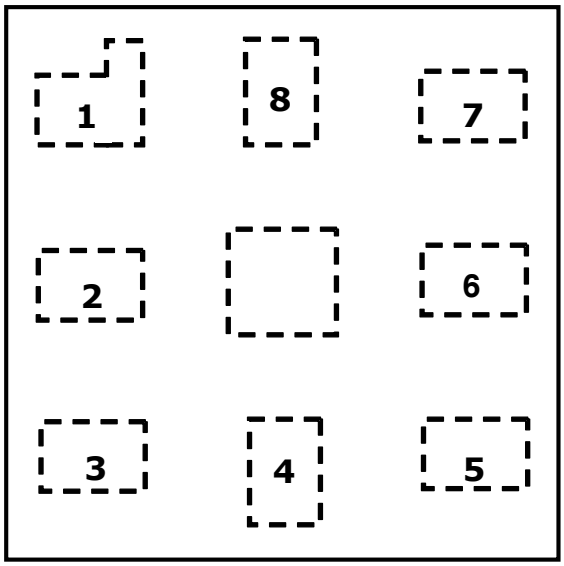



Fig.1 Application Circuit Example

## ■ PIN ASSIGNMENT




**(Top view)**

Fig.2 Pin Assignment

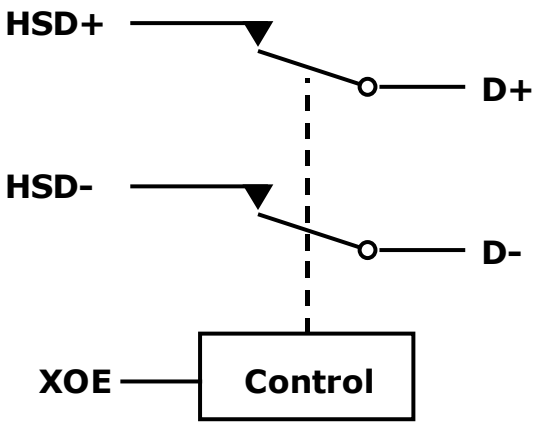



Fig.3 Bus switch symbol

* Central land area in this IC is not used. Do not mount any pin.

## ■ PIN DESCRIPTION

| Pin No. | Pin Name | Pin Description |
|---|---|---|
| 1 | XOE | Bus switch enable input pin |
| 2 | HSD+ | Data port (+) |
| 3 | D+ | Data port (+) |
| 4 | GND | GND pin |
| 5 | D- | Data port (-) |
| 6 | HSD- | Data port (-) |
| 7 | (NC) | NC pin |
| 8 | $V_{CC}$ | Power supply pin |

## ■ TRUTH TABLE

| XOE | Bus Switch status |
|---|---|
| HIGH | Disconnected |
| LOW | HSD+ =D+, HSD- =D- |

## ■ BLOCK DIAGRAM

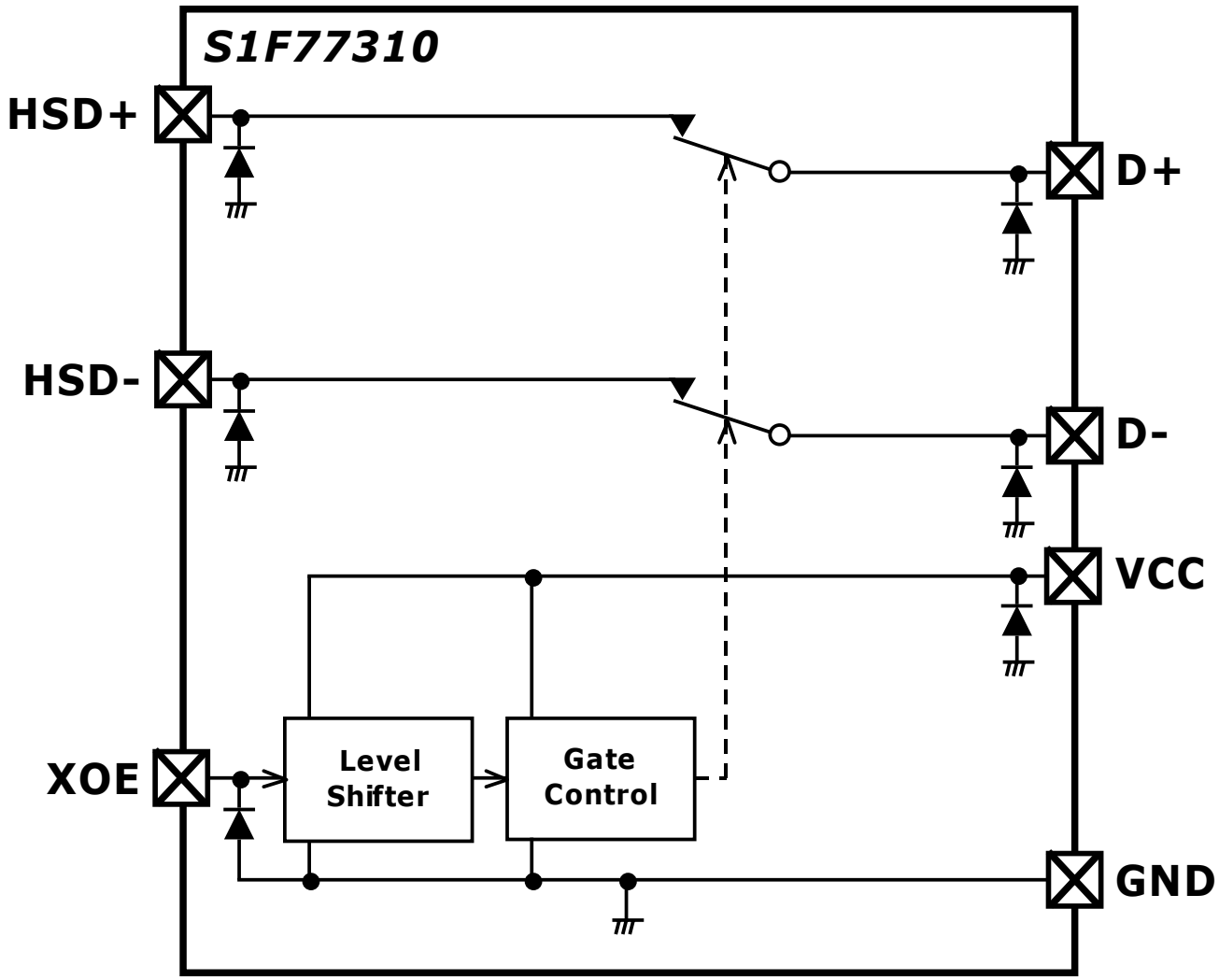



Fig.4 Block diagram

## ■ ELECTRICAL CHARACTERISTICS

## ■ ABSOLUTE MAXIMUM RATINGS

| Item | | Symbol | Min. | Max. | Unit |
|---|---|---|---|---|---|
| Supply voltage | | $V_{CC}$ | -0.3 | 4.6 | V |
| Input pin voltage | XOE | $V_{IN}$ | -0.3 | 7.0 | V |
| Switch input voltage | HSD+,HSD-,D+,D- | $V_{SW}$ | -0.3 | 7.0 | V |
| Storage temperature | | $T_{STG}$ | -65 | 150 | °C |

## ■ RECOMMENDED OPERATING CONDITIONS

| Item | | Symbol | Min. | Max. | Unit |
|---|---|---|---|---|---|
| Supply voltage | | $V_{CC}$ | 3.0 | 3.6 | V |
| Input pin voltage | XOE | $V_{IN}$ | 0.0 | 5.5 | V |
| Switch input voltage | HSD+,HSD-,D+,D- | $V_{SW}$ | 0.0 | 5.5 | V |
| Operating temperature | | $T_a$ | -40 | 85 | °C |

## ■ DC ELECTRICAL CHARACTERISTICS

(Without protrusion:Ta= -40°C to 85°C)

| Item | Symbol | Conditions | Vcc[V] | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Clamp diode voltage | $V_{IK}$ | $I_L$=18mA | 3.0 | | | -1.2 | V |
| High Level Input voltage | $V_{IH}$ | | 3.0 to 3.6 | 1.2 | | | V |
| Low Level Input voltage | $V_{IL}$ | | 3.0 to 3.6 | | | 0.4 | V |
| Input Leakage current | $I_{IN}$ | $0V \le V_{IN} \le V_{CC}$ | 3.6 | -1.0 | | 1.0 | μA |
| OFF Stage Leakage current | $I_{OZ}$ | $0V \le V_{SW} \le V_{CC}$ | 3.6 | -1.0 | | 1.0 | μA |
| Power off Leakage current (D+, D-) | $I_{OFF}$ | $0V \le V_{SW} \le V_{CC}, V_{CC}$=0V | 0.0 | -2.0 | | 2.0 | μA |
| Switch ON resistance | $R_{ON}$ | $V_{SW}$=0.4V,$I_{ON}$, = -8mA | 3.0 | | 5.3 | 8.0 | Ω |
| ΔON resistance | $\Delta R_{ON}$ | $V_{SW}$=0.4V,$I_{ON}$, = -8mA | 3.0 | | 0.35 | | Ω |
| ON resistance flatness | $R_{ON(Flat)}$ | $0V \le V_{SW} \le 1V, I_{ON}$= -8mA | 3.0 | | 2 | | Ω |
| Quiesent current | $I_{CC}$ | $V_{IN}$=3.6V | 3.6 | | | 1.0 | μA |
| Current consumption | $I_{CCT}$ | $V_{IN}$=0V,$V_{SW}$=2.6V | 3.6 | | | 14.0 | μA |

* Describe the value based on the USB full speed standard.

## ■ AC ELECTRICAL CHARACTERISTICS

(Without protrusion:Ta= -40°C to 85°C)

| Item | Symbol | Conditions | Vcc[V] | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Turn ON Time | $t_{ON}$ | $R_L$=50Ω, $C_L$=5pF | 3.0 to 3.6 | | 5 | 20 | μs |
| Turn OFF Time | $t_{OFF}$ | $R_L$=50Ω, $C_L$=5pF | 3.0 to 3.6 | | 21 | 40 | ns |
| Propagation Delay | $t_{PD}$ | $R_L$=50Ω, $C_L$=5pF | 3.3 | | 0.25 | | ns |
| OFF Isolation | $O_{IRR}$ | $R_L$=50Ω, $C_L$=0pF, f=240MHz | 3.0 to 3.6 | | -35 | | dB |
| Crosstalk | $X_{talk}$ | $R_L$=50Ω, f=240MHz | 3.0 to 3.6 | | -40 | | dB |
| -3dB Bandwidth | BW | $R_L$=50Ω, $C_L$=0pF, f=240MHz | 3.0 to 3.6 | | 1000 | | MHz |
| Channel to Channel Skew | $t_{SK(O)}$ | $R_L$=50Ω, $C_L$=5pF | 3.0 to 3.6 | | 50 | | ps |
| Skew of Opposite Transitions of the Same Output | $t_{SK(P)}$ | $R_L$=50Ω, $C_L$=5pF | 3.0 to 3.6 | | 20 | | ps |
| Total Jitter | tj | $R_L$=50Ω, $C_L$=5pF, $t_R$=$t_F$=500ps at 480Mbps | 3.0 to 3.6 | | 200 | | ps |

## ■ CAPACITANCE

(Without protrusion:Ta= -40°C to 85°C)

| Item | Symbol | Conditions | Vcc[V] | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| Control input pin capacitance | $C_{IN}$ | $V_{CC}$=0V, f=1MHz | 0.0 | | 7.0 | | pF |
| Bus switch ON capacitance | $C_{ON}$ | $V_{IN}$=0V,f=1MHz | 3.3 | | 3.7 | | pF |
| Bus switch OFF capacitance | $C_{OFF}$ | $V_{CC}$=0V,f=1MHz | 0.0 | | 1.7 | | pF |

**SEIKO EPSON CORPORATION**

SEMICONDUCTOR OPERATIONS DIVISION

**IC Sales Department**
**IC International Sales Group**
421-8 Hino, Hino-shi, Tokyo 191-8501, JAPAN
Phone: 042-587-5814 FAX: 042-587-5117

■ EPSON Electronic devices Website

**http://www.epson.jp/device/semicon_e/**

Document code: 411494400
First issue August, 2008 in Japan