

# S1F77330 Series

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## Power Bus Switch IC 2 to 1 Bus Switch

### ■ OVERVIEW

The S1F77330 series is the bus switch suitable for USB applications. The adopted CMOS process technology characterizes the S1F77330 series by low power consumption. The compact WCSP adopted for the package enables the S1F77330 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 : 14 $\mu$ A (MAX)
- Static current : 1 $\mu$ A (MAX)
- Bus switch ON resistance : 6.0 $\Omega$  (typ)
- Bus switch pin capacity (D system) : 2.7pF (typ)
- Bus switch pin capacity (D\* system) : 1.45pF (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-based equipment

### ■ PACKAGE

- S1F77330M0A : PLP-10 (2.50mm $\times$ 2.70mm)
- S1F77330B0A : WCSP-10 (1.118mm  $\times$  1.625mm)

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## ■ APPLICATION CIRCUIT EXAMPLE

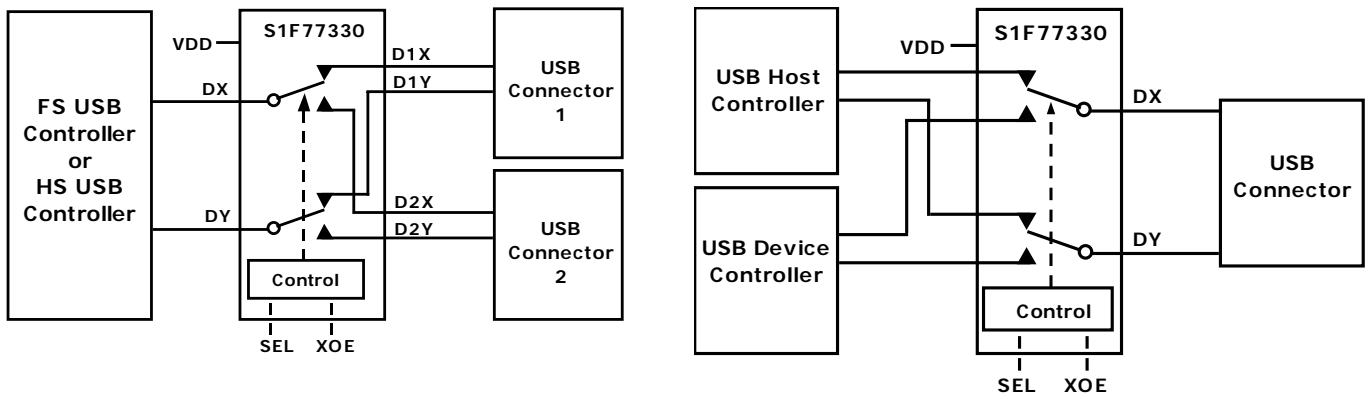
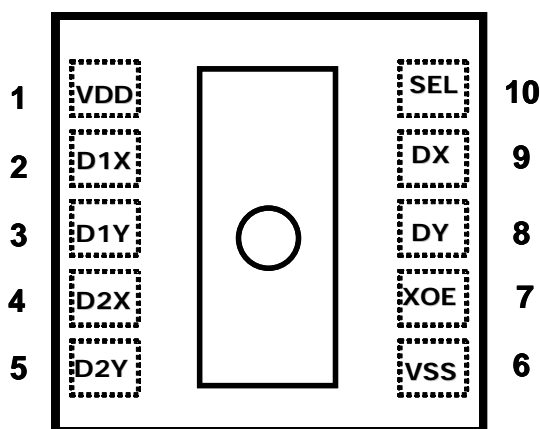


Fig.1 Application Circuit Example

# S1F77330 Series

## ■ PIN ASSIGNMENT (S1F77330M0A)



(Top view)

Fig.2 Pin Assignment

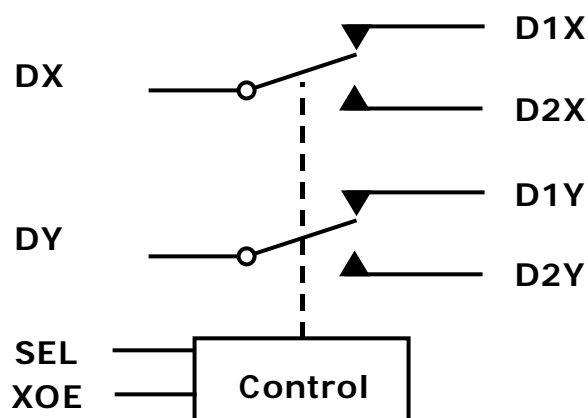


Fig.3 Bus switch symbol

## ■ PIN DESCRIPTION (S1F77330M0A)

Pin No.	Pin Name	Pin Description
1	VDD	Power supply pin
2	D1X	Data port 1 (X)
3	D1Y	Data port 1 (Y)
4	D2X	Data port 2 (X)
5	D2Y	Data port 2 (Y)
6	Vss	GND pin
7	XOE	Bus switch enable input pin
8	DY	Data port COM(Y)
9	DX	Data port COM(X)
10	SEL	Switch select input pin

## ■ TRUTH TABLE (S1F77330M0A)

SEL	XOE	Bus Switch status
X	HIGH	Disconnected
LOW	LOW	DX = D1X, DY = D1Y
HIGH	LOW	DX = D2X, DY = D2Y

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## ■ PIN ASSIGNMENT (S1F77330B0A)

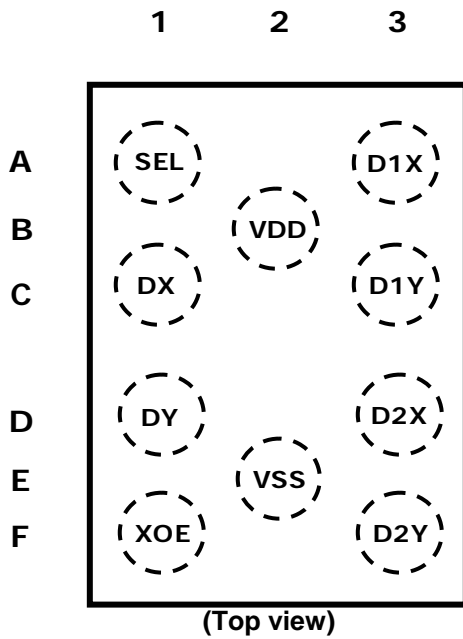


Fig.2 Pin Assignment

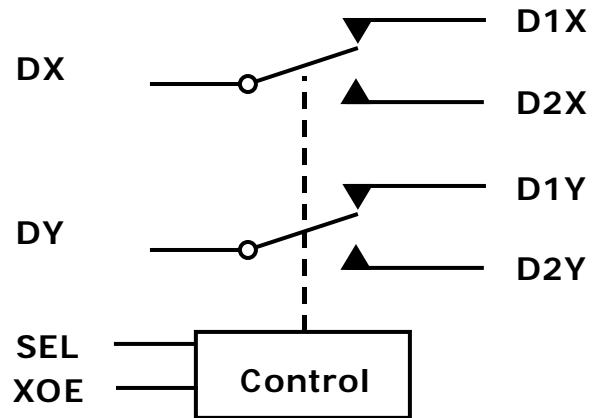


Fig.3 Bus switch symbol

## ■ PIN DESCRIPTION (S1F77330B0A)

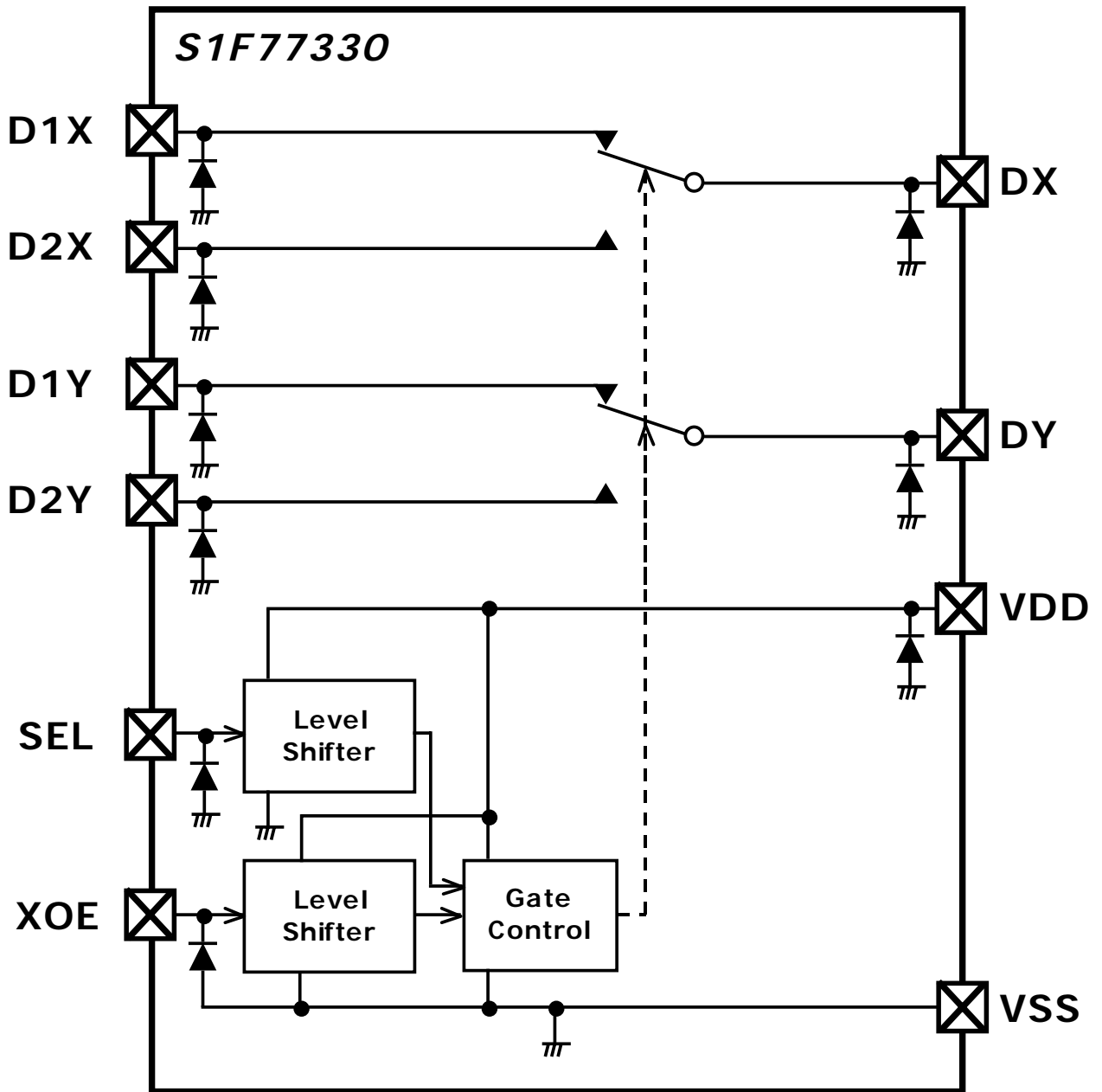
Pin No.	Pin Name	Pin Description
A1	SEL	Switch select input pin
C1	DX	Data port COM(X)
D1	DY	Data port COM(Y)
F1	XOE	Bus switch enable input pin
E2	Vss	GND pin
F3	D2Y	Data port 2 (Y)
D3	D2X	Data port 2 (X)
C3	D1Y	Data port 1 (Y)
A3	D1X	Data port 1 (X)
B2	VDD	Power supply pin

## ■ TRUTH TABLE (S1F77330B0A)

SEL	XOE	Bus Switch status
X	HIGH	Disconnected
LOW	LOW	DX = D1X, DY = D1Y
HIGH	LOW	DX = D2X, DY = D2Y

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## ■ BLOCK DIAGRAM



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## ■ ELECTRICAL CHARACTERISTICS

### ■ ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	
Supply voltage	V <sub>DD</sub>	-0.3	4.6	V	
Input pin voltage	XOE, SEL	V <sub>IN</sub>	-0.3	7.0	V
Switch input voltage	D1X,D2X,D1Y,D2Y,DX,DY	V <sub>SW</sub>	-0.3	7.0	V
Storage temperature	T <sub>STG</sub>	-65	150	°C	

### ■ RECOMMENDED OPERATING CONDITIONS

Item	Symbol	Min.	Max.	Unit	
Supply voltage	V <sub>DD</sub>	3.0	3.6	V	
Input pin voltage	XOE, SEL	V <sub>IN</sub>	0.0	5.5	V
Switch input voltage	D1X,D2X,D1Y,D2Y,DX,DY	V <sub>SW</sub>	0.0	5.5	V
Operating temperature	T <sub>a</sub>	-40	85	°C	

### ■ DC ELECTRICAL CHARACTERISTICS

(Without protrusion: T<sub>a</sub> = -40°C to 85°C)

Item	Symbol	Conditions	V <sub>DD</sub> [V]	Min.	Typ.	Max.	Unit
Clamp diode voltage	V <sub>IK</sub>	I <sub>L</sub> =18mA	3.0			-1.2	V
High Level Input voltage	V <sub>IH</sub>		3.0 to 3.6	1.2			V
Low Level Input voltage	V <sub>IL</sub>		3.0 to 3.6			0.4	V
Input pin leak	I <sub>IN</sub>	0V ≤ V <sub>IN</sub> ≤ V <sub>CC</sub>	3.6	-1.0		1.0	μA
Switch off leak	I <sub>OZ</sub>	0V ≤ V <sub>SW</sub> ≤ V <sub>CC</sub>	3.6	-1.0		1.0	μA
Power off Leakage current (DX, DY)	I <sub>OFF</sub>	0V ≤ V <sub>SW</sub> ≤ V <sub>CC</sub> , V <sub>CC</sub> =0V	0.0	-2.0		2.0	μA
Switch ON resistance	R <sub>ON</sub>	V <sub>SW</sub> =0.4V, I <sub>ON</sub> = -8mA	3.0		6.0	9.0	Ω
ΔON resistance	ΔR <sub>ON</sub>	V <sub>SW</sub> =0.4V, I <sub>ON</sub> = -8mA	3.0		0.35		Ω
ON resistance flatness	R <sub>ON</sub> (Flat)	0V ≤ V <sub>SW</sub> ≤ 1V, I <sub>ON</sub> = -8mA	3.0		2.0		Ω
Quiescent current	I <sub>CC</sub>	V <sub>IN</sub> =3.6V	3.6			1.0	μA
Current consumption	I <sub>CC</sub> T	V <sub>IN</sub> =0V, V <sub>SW</sub> =2.6V	3.6			14.0	μA

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

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## ■ AC ELECTRICAL CHARACTERISTICS

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

Item	Symbol	Conditions	VDD[V]	Min.	Typ.	Max.	Unit
Turn ON Time	tON	RL=50Ω, CL=5pF	3.0 to 3.6		5	21	μs
Turn OFF Time	tOFF	RL=50Ω, CL=5pF	3.0 to 3.6		23	50	ns
Propagation Delay	tPD	RL=50Ω, CL=5pF	3.3		0.25		ns
OFF Isolation	OIRR	RL=50Ω, CL=0pF, f=240MHz	3.0 to 3.6		-34		dB
Crosstalk	Xtalk	RL=50Ω, f=240MHz	3.0 to 3.6		-30		dB
-3dB Bandwidth	BW	RL=50Ω, CL=0pF, f=240MHz	3.0 to 3.6		900		MHz
Channel to Channel Skew	tSK(O)	RL=50Ω, CL=5pF	3.0 to 3.6		50		ps
Skew of Opposite Transitions of the Same Output	tSK(P)	RL=50Ω, CL=5pF	3.0 to 3.6		20		ps
Total Jitter	tj	RL=50Ω, CL=5pF, tr=tf=500ps at 480Mbps	3.0 to 3.6		200		ps

## ■ CAPACITANCE

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

Item	Symbol	Conditions	VDD[V]	Min.	Typ.	Max.	Unit
Control input pin capacitance	CIN	VDD=0V, f=1MHz	0.0		7.0		pF
Bus switch ON capacitance	CON	VIN=0V, f=1MHz	3.3		4.4		pF
Bus switch OFF capacitance1 (D1X, D1Y, D2X, D2Y)	COFF1	VDD=0V, f=1MHz	0.0		1.45		pF
Bus switch OFF capacitance2 (DX, DY)	COFF2	VDD=0V, f=1MHz	0.0		2.7		pF

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