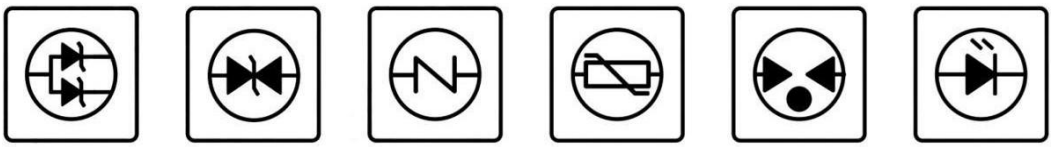
MSKSEMI 美森科
SEMICONDUCTOR



MSKUSB30

Product specification

High Speed USB2.0(480Mbsp) DPDT Analog Switch

Description

The MSKUSB30 is a high bandwidth, fast double-pole double-throw (DPDT) analog switch. Its wide bandwidth and low bit-to-bit skew allow it to pass high-speed differential signals with good signal integrity. Each switch is bidirectional and offers little or no attenuation of the high-speed signals at the outputs.Its high channel-to-channel crosstalk rejection results in minimal noise interference.

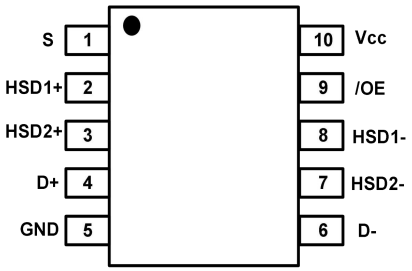
Features

- SupplyRange:1.8V to 5.5V
- Rail-to-RailSignalRange
- On-ResistanceMatching:0.05Ω(TYP)
- ON-Resistance:4.5Ω(TYP)at 4.5V
- ON-ResistanceFlatness:0.9Ω(TYP)at4.5V
- HighOffIsolation:-32dB at 250MHz
- -41 dB(250MHz)Crosstalk Rejection Reduces
- Break-Before-MakeSwitching
- -3dB Bandwidth:720MHz
- OperationTemperatureRange:-40°Cto+85°C

Typical Applications

- Cell Phones
- PDAs
- Portable Instrumentation
- Differential Signal Data Routings
- USB 2.0 Signal Routing

Connection Diagrams and Pin Description

VSSOP-10-0.5mm	PIN DESCRIPTION	MARKING
		

Copyright© Msksemi Incorporated

Pin Description

Name	Pin Number	Description
	VSSOP-10-0.5mm	
V+	10	Positive Power Supply
S	1	Select Input
D+,D-	4,6	Data Ports
HSD1+,HSD1-	2,7	Data Ports 1
HSD2+,HSD2-	3,8	Data Ports 2
/OE	9	Output Enable
GND	5	Ground

Logic Function Table

/OE	S	HSD1+,HSD1-	HSD2+,HSD2-
0	0	ON	OFF
0	1	OFF	ON
1	X	OFF	OFF

ORDER INFORMATION

ORDERING NUMBER	PACKAGE	PACKING OPTION
MSKUSB30	VSSOP-10-0.5mm	4000PCS

Copyright© Msksemi Incorporated

Absolute Maximum Ratings

Parameters		Min.	Max.	Unit
V+	Supply Voltage Range	-0.3	6	V
V_{IS}	Analog, Digital Voltage Range	-0.3	(V+)+0.3	V
I_{IN}	Continuous Current HSDn or Dn	-100	+100	mA
I_{peak}	Peak Current HSDn or Dn	-150	+150	mA
T_J	Junction Temperature		150	°C
T_{stg}	Storage Temperature	-65	150	°C

(1) Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

(2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

ESD Ratings

ESD			Value	Unit
V(ESD)	Electrostatic Discharge	Human-Body Model (HBM)	5K	V
		Charged-Device Model (CDM)	2K	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

Recommended Operating Conditions

Over operating free-air temperature range (unless otherwise noted)

Symbol	Parameter	Min	Max	Unit
Vcc	Supply Voltage	1.8	5.5	V
T_A	Operating Temperature	-40	85	°C

(1) All unused digital inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

Thermal Information

Package Type	θ_{JA}	θ_{JC}	Unit
VSSOP-10-0.5mm	180.7	66.2	°C/W

Copyright© Msksemi Incorporated

Electrical Characteristics

T_A =＋25°C,V+=1.8V to 5.5V,GND=0V(unless otherwise noted)

Parameter	Symbol	Conditions	V+	Temp	Min	Typ	Max	Units
Analog Switch								
On-Resistance	R_{ON}	V_{IS}=0V to 0.4V, I_D=10mA.	4.5V	+25°C		4.5	5	Ω
				Full			7	
			3V	+25°C		6.5	7	Ω
				Full			10	
On-Resistance Flatness	R_{FLAT}	V_{IS}=0V to 1.0V, I_D=10mA.	4.5V	+25°C		0.9	1.2	Ω
				Full			1.5	
			3V	+25°C		3.2	3.5	Ω
				Full			4.5	
On-Resistance Matching	ΔR_{ON}	V_{IS}=0V to 0.4V, I_D=10mA.	4.5V	+25°C		0.05	0.1	Ω
				Full			0.15	
			3V	+25°C		0.05	0.1	Ω
				Full			0.15	
Increase In Icc per Control Voltage	I_{CCT}	Vs or $V_{/OE}$=2.6 V	4.3V	Full			20	μA
Source Off Leakage Current	$I_{HSD2(OFF)}$ $I_{HSD1(OFF)}$	V_{IS}=5V/ 0.5V,V_D=0.5V/ 5V	5.5V	Full			1	μA
Channel On Leakage Current	$I_{HSD2(ON)}$ $I_{HSD1(ON)}$	V_{IS}=5V/ 0.5V,V_D=floating	5.5V	Full			1	μA
Digital Control Inputs								
Input High Voltage	V_{IH}		3.3V	Full	1.7			V
Input Low Voltage	V_{IL}		3.3V	Full			0.5	V
Input Leakage current	I_{IN}	Vs, $V_{/OE}$=0V or V+	5.5V	Full			1	μA
Power Requirements								
Power Supply Range	V+			Full	1.8		5.5	V
Quiescent Supply Current	Icc	Vs, $V_{/OE}$=0V or V+	5.5V	Full			1	μA

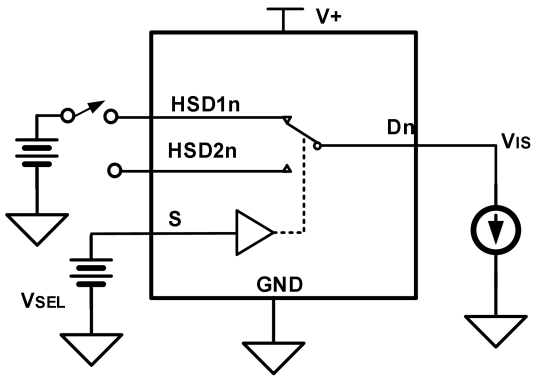
Copyright© Msksemi Incorporated

Electrical Characteristics (Continued)

T_A =＋25°C,V+=1.8V to 5.5V,GND=0V(unless otherwise noted)

Parameter	Symbol	Conditions	V+	Temp	Min	Typ	Max	Units
Turn-On Time	t_{ON}	V_{IS}=0.8V, R_L=50Ω, C_L=10pF.	5V	+25°C		12		ns
			3.3V	+25°C		14		ns
Turn-Off Time	t_{OFF}	V_{IS}=0.8V, R_L=50Ω, C_L=10pF.	5V	+25°C		6		ns
			3.3V	+25°C		8		ns
Break-Before-Make Delay	t_{BBM}	V_{IS}=0.8V, R_L=50Ω, C_L=10pF.	5V	+25°C		5		ns
			3.3V	+25°C		4		ns
-3 dB Bandwidth	BW	Signal=0dBm, R_L=50Ω C_L=5pF.	5V	+25°C		720		MHz
			3.3V	+25°C		700		MHz
Off-Isolation	OIRR	Signal=0dBm, R_L=50Ω, f=250MHz.	5V	+25°C		-32		dB
			3.3V	+25°C		-32		dB
Non-Adjacent Channel Crosstalk	XTALK	Signal=0dBm, R_L=50Ω, f=250MHz.	5V	+25°C		-41		dB
			3.3V	+25°C		-41		dB
Channel-to-Channel Skew	t_{SKEW}	R_L=50Ω,C_L=10pF.	5V	+25°C		0.1		ns
		R_L=50Ω,C_L=10pF.	3.3V	+25°C		0.1		ns
Charge Injection	Q	R_G=0Ω, C_L=1nF.	5V	+25°C		6		pC
		R_G=0Ω, C_L=1nF.	3.3V	+25°C		4		pC
On Capacitance	C_{ON}		5V	+25°C		6		pF
			3.3V	+25°C		6		pF

Measurement Information



Channel On

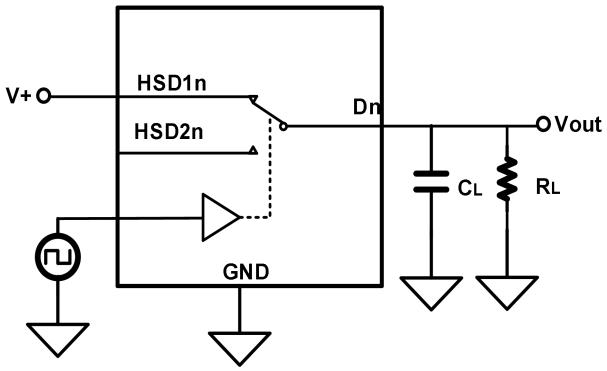
RON=(VHDS1n or VHSD2n-VIS)/ID

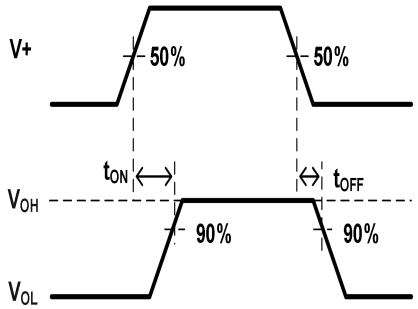
VSEL=VIH or VIL

ON-State Resistance (R_{ON})

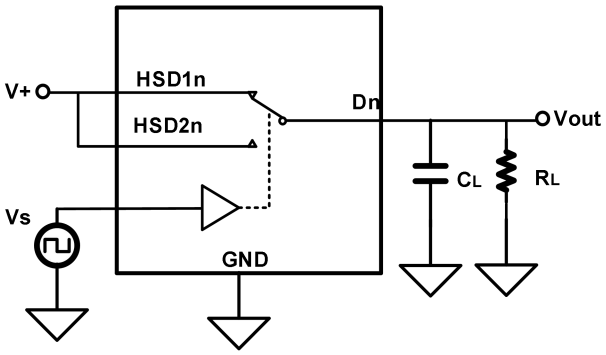
Copyright© Msksemi Incorporated

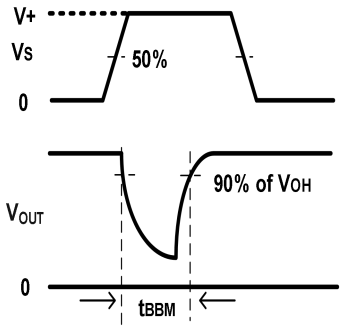
Measurement Information(Continued)



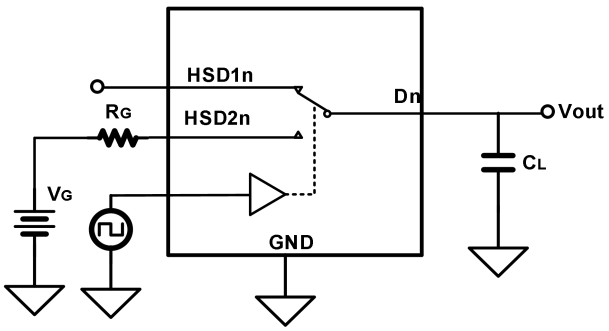


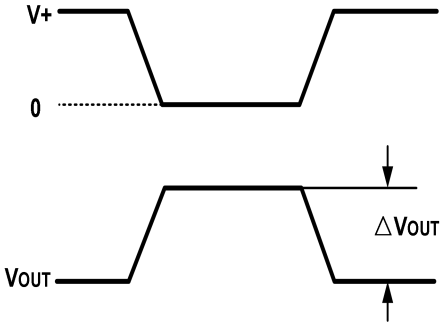
Turn-On (t_{ON}) and Turn-Off Time (t_{OFF})





Break-Before-Make Time Delay (t_{BBM})

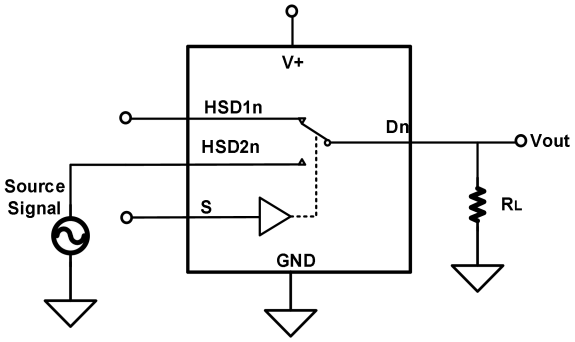




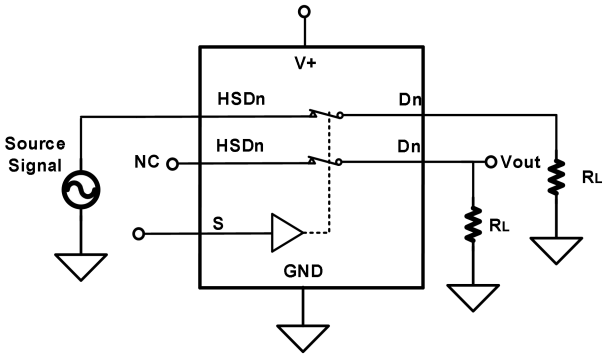
$Q=\triangle V_{OUT} \times C_L$

Charge Injection (Q)

Measurement Information(Continued)

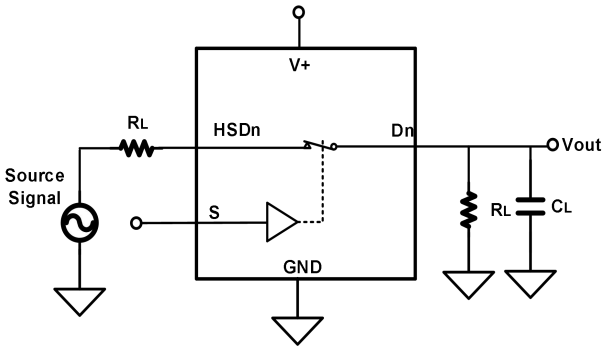


Off Isolation(OIRR)



Channel To Channel Crosstalk=-20 × log (V_{HSDn}/V_{OUT})

Channel-to-Channel Crosstalk



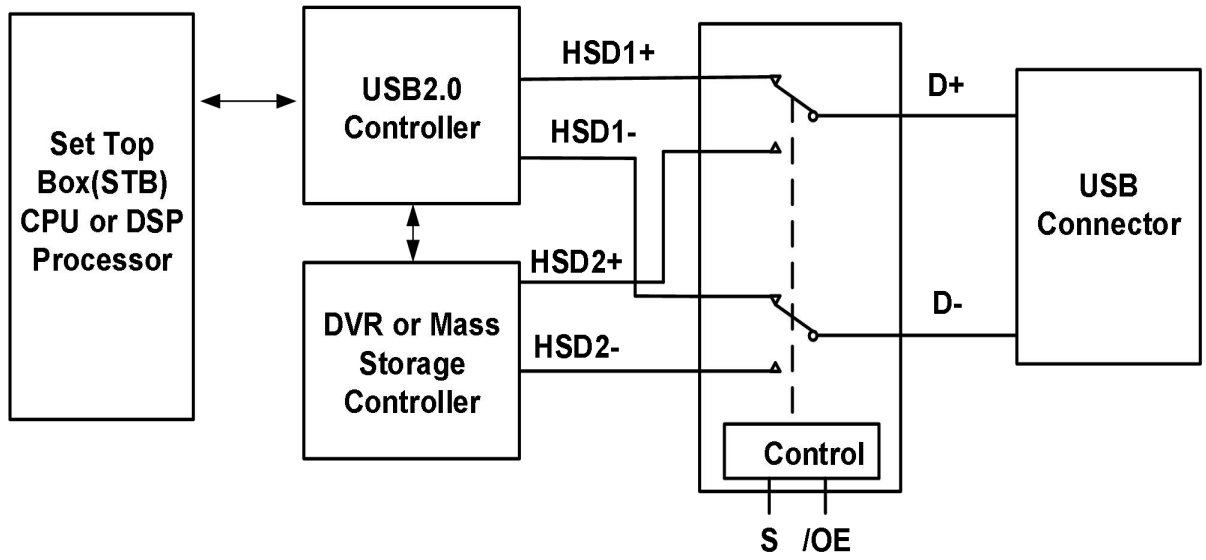
-3dB Bandwidth

Copyright© Msksemi Incorporated

Applications Note

There are many USB applications in which the USB hubs or controllers have a limited number of USB I/Os. The MSKUSB30 solution can effectively expand the limited USB I/Os by switching between multiple USB buses inorder to interface them to a single USB hub or controller. MSKUSB30 can also be used to connect a singlecontroller to two USB connectors or controllers.

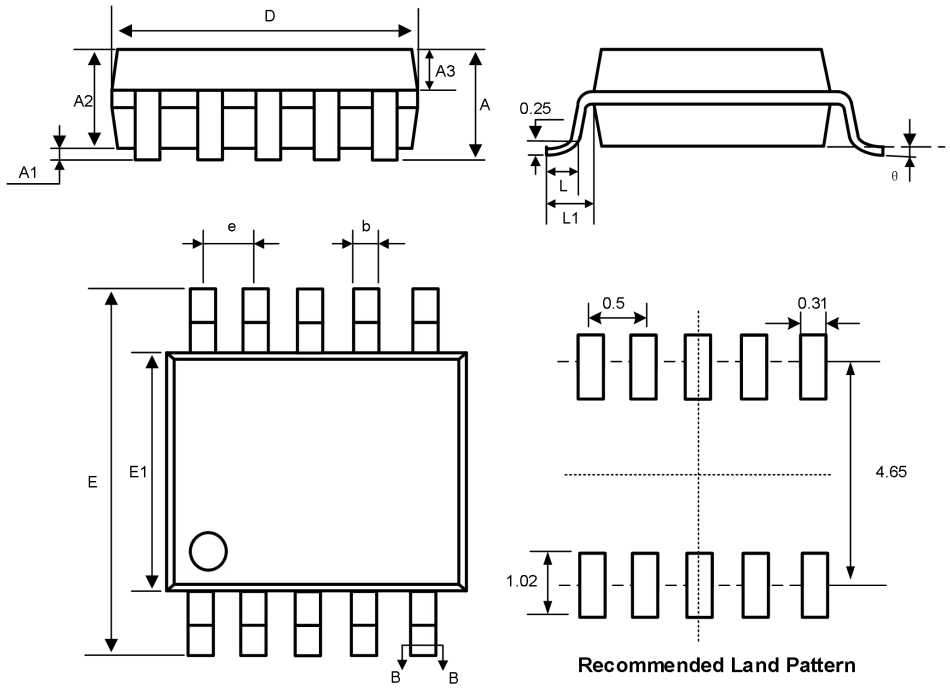
Design requirements of the USB 1.0, 1.1, and 2.0 standards should be followed. It is recommended that the digital control pins S and /OE be pulled up to V+ or down to GND to avoid undesired switch positions that could result from the floating pin.



Application Diagram

Package Outline Dimension

VSSOP-10-0.5mm



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	—	—	1.10	—	—	0.043
A1	0.05	—	0.15	0.002	—	0.006
A2	1.30	1.40	1.50	0.051	0.055	0.059
A3	0.75	0.85	0.95	0.030	0.033	0.037
D	2.90	3.00	3.10	0.114	0.118	0.122
E	4.70	4.90	5.10	0.185	0.193	0.201
E1	2.90	3.00	3.10	0.114	0.118	0.122
e	0.50BSC			0.02BSC		
L	0.40	—	0.70	0.016	—	0.028
L1	0.95REF			0.037REF		
θ	0	—	8°	0	—	8°

Copyright© Msksemi Incorporated

Attention

■ Any and all MSKSEMI Semiconductor products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your MSKSEMI Semiconductor representative nearest you before using any MSKSEMI Semiconductor products described or contained herein in such applications.

■ MSKSEMI Semiconductor assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specificationsof any andall MSKSEMI Semiconductor products described orcontained herein.

■ Specifications of any and all MSKSEMI Semiconductor products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer'sproducts orequipment.

■ MSKSEMI Semiconductor. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with someprobability. It is possiblethat these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits anderror prevention circuitsfor safedesign, redundant design, and structural design.

■ In the event that any or all MSKSEMI Semiconductor products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from theauthorities concerned in accordance with the above law.

■ No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of MSKSEMI Semiconductor.

■ Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. MSKSEMI Semiconductor believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringementsof intellectual property rights or other rightsof third parties.

■ Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. Whendesigning equipment, referto the "Delivery Specification" for the MSKSEMI Semiconductor productthat you intend to use.

Copyright© Msksemi Incorporated