

Features

- Low On-resistance, $R_{on}=10\Omega$
- Differential 2:1 or 1:2 Switch/Multiplexer
- Up to DC 30V Overvoltage Protection (OVP) on D+/- Ports
- IEC 64000-4-5 Surge Protection w/o External TVS onto D+/- Ports: $\pm 30V$
- System Side Clamp Voltage Pulse Less than 9V, Duration Less than 200nS
- Insertion loss: -1dB@200MHz, -2dB @650MHz, -3dB@1GHz
- Wide Supply Range (2.5V ~ 5.5V)

Applications

- Mobile Phones, Tablets and Notebooks
- Anywhere a USB Type-C™ or Micro-B Connector is Used

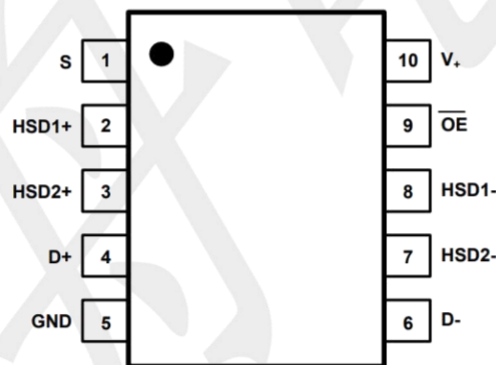
General Description

The is a bidirectional low-power dual port, high-speed, USB 2.0 analog switch with integrated protection for USB Type-C™ systems. The device is configured as a dual 2:1 or 1:2 switch. It is optimized for use with the USB 2.0 DP/DM lines in a USB Type-C™ system.

The integrated over-voltage protection on the D+/- pins can withstand up to DC 30V with automatic shutoff circuitry in order to protect system components behind the switch. GPIO controls of SEL and $\overline{OE}$ are 1.8V logic compatible.

The is available in MSOP-10L with Pb-free and Halogen-free making it a perfect candidate for mobile and space constrained applications.

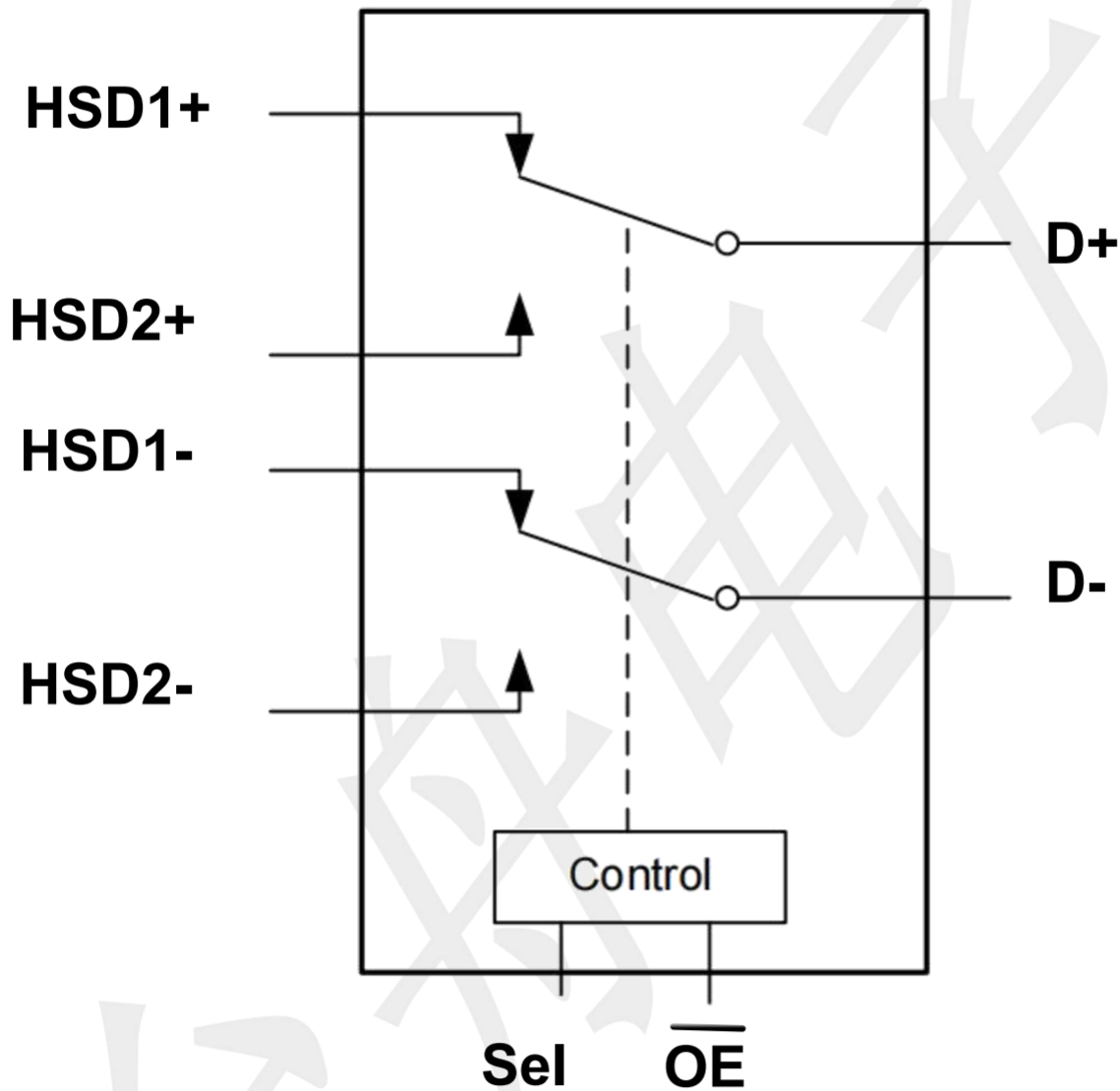
PIN CONFIGURATIONS (TOP VIEW)



PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	S	Logic Input Selection Sel
2	HSD1+	Multiplexed Source Inputs
3	HSD2+	Multiplexed Source Inputs
4	D+	USB Data Bus
5	GND	Ground
6	D-	USB Data Bus
7	HSD2-	Multiplexed Source Inputs
8	HSD1-	Multiplexed Source Inputs
9	$\overline{OE}$	output enable input (active LOW)
10	V+	Supply voltage VCC

BLOCK DIAGRAM



Function Table

$\overline{OE}$	Input Sel	D+:HSD1+ , D-:HSD1-	D+:HSD2+ , D-:HSD2-
0	0	ON	OFF
0	1	OFF	ON
1	X	OFF	OFF

Switches Shown For Logic "0" Input

Absolute Maximum Ratings

(Unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	VCC	-0.3 ~ +6.5	V
Input Voltage	VIN	-0.3 ~ +6.5	V
Continuous Current Through HSD1,HSD2, D		±50	mA
Peak Current Through HSD1,HSD2, D (pulsed at 1ms 50% duty cycle)		±100	mA
Storage Temperature Range	TSTG	-55 ~ +150	°C
Operating Junction Temperature	TJ	150	°C
Lead Temperature (Soldering, 10 seconds)	TL	260	°C
Power Dissipation	PD	250	mW

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

Recommend operating ratings

(Unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage Operating	VCC	2.5 ~ 5.5	V
Control Input Voltage	VIN	-0.3 ~ 5.5	V
Input Signal Voltage	VD	-0.3 ~ 30	V
Operating Temperature	TA	-40 ~ +85	°C
Junction to Ambient	RθJA	360	°C/W

Electrical Characteristics (Ta=25°C, VDD=3.3V, unless otherwise specified)

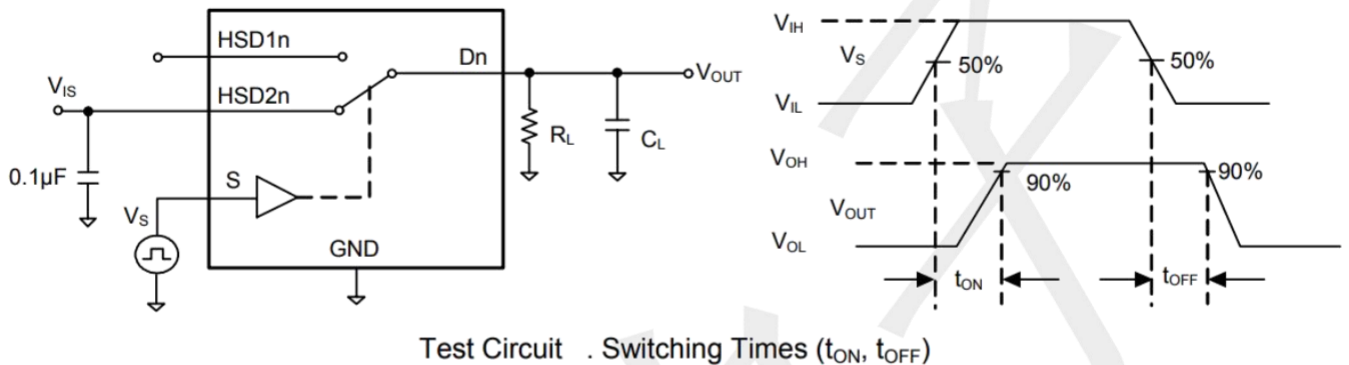
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
POWER SUPPLY						
Supply Voltage Range	VDD		2.5	3.3	5.5	V
Supply Current	I _{CC}	$\overline{\text{OE}} = 1$ disconnection	--	5	13	uA
		$\overline{\text{OE}} = 0$ connection	--	33	60	uA
SEL/_EN DIGITAL INPUT CONTROL						
control input logic high	V _{IH}		1.6	--	5.5	V
control input logic low	V _{IL}		-0.1	--	0.5	V
Internal pull-down resistor	R _{PD}		--	2	--	MΩ
SWITCH ON RESISTANCE AND OFF LEAKAGE						
On-Resistance	R _{ON}	V _{IS} = 0V~0.4V I _{OUT} =8mA	--	10	11	Ω
R _{ON} Flatness ⁽¹⁾	R _{FLAT}	V _{IS} = 0V~0.4V I _{OUT} =8mA	--	0.3	0.5	Ω
R _{ON} Matching Between Channels ⁽²⁾	ΔR _{ON}	V _{IS} = 0V~0.4V I _{OUT} =8mA	--	0.1	0.2	Ω
OFF Leakage Current	I _{LEAK}	V _{C0+/-} = 10V V _{L1+/-} = V _{D2+/-} =0V	--	31	50	uA
SWITCH DYNAMICS						
On Capacitance	C _{ON}	V _{C0+/-} = 0.2V, f = 1MHz	--	4	--	pF
Off Capacitance	C _{OFF}	V _{C0+/-} = 0.2V, f = 1MHz	--	3	--	pF
Off Isolation	Off	f = 250MHz, R _T = 50Ω, C _L = 0pF	--	-38	--	dB
Crosstalk ⁽³⁾ (Channel-to-Channel)	X _{TALK}	f = 250MHz, R _T = 50Ω, C _L = 0pF	--	-41	--	dB
-3dB Bandwidth	BW	R _T =50Ω, C _L =0pF Signal Power 0dBm	1.0	1.1		GHz
Break-Before-Make	BBM	V _{L1+/-} = V _{D2+/-} = 0.4V, R _L =50Ω	--	1.5	--	uS
Turn-on Time	t _{OFF}	V _{C0+/-} = 0.4V, R _L =50Ω _EN switches from High to Low	--	20	--	uS
Turn-off Time	t _{OFF}	V _{C0+/-} = 0.4V, R _L =50Ω _EN switches from Low to High	--	1.2	--	uS
Propagation Delay	t _{PD}	V _{C0+/-} = 0.4V, R _L =50Ω	--	200	--	pS
OVER VOLTAGE PROTECTION						
OVP Lockout Threshold	V _{OVP}	V _{C0+/-} Rising Edge	4.6	4.9	5.2	V
OVP Hysteresis	V _{HYS}	V _{C0+/-} Falling Edge	--	200	--	mV
Clamp Voltage on L1+/- and D2+/-	V _{CLAMP}	10V shorts to C0+/- with R _L =1KΩ @ L1+/- and D2+/-	--	6.5	8	V
OVP Response Time	t _{FP}	10V shorts to C0+/- with R _L =1KΩ @ L1+/- and D2+/-	--	200	300	nS
OVP Recovery Time	t _{FPR}	V _{C0+/-} jumps from 6V to 1V step	30	45	60	uS

Note:(1) Flatness is defined as the difference between maximum and minimum value of ON-resistance at the specified analog signal voltage points.

(2) R_{ON} matching between channels is calculated by subtracting the channel with the lowest max Ron value from the channel with the highest max Ron value.

(3) Crosstalk is inversely proportional to source impedance

Functions and Pin Configuration



Typical Performance Curves ($T_a=25^\circ C$, $V_{DD}=3.0V$, $CAP=0.1\mu F$, unless otherwise noted)

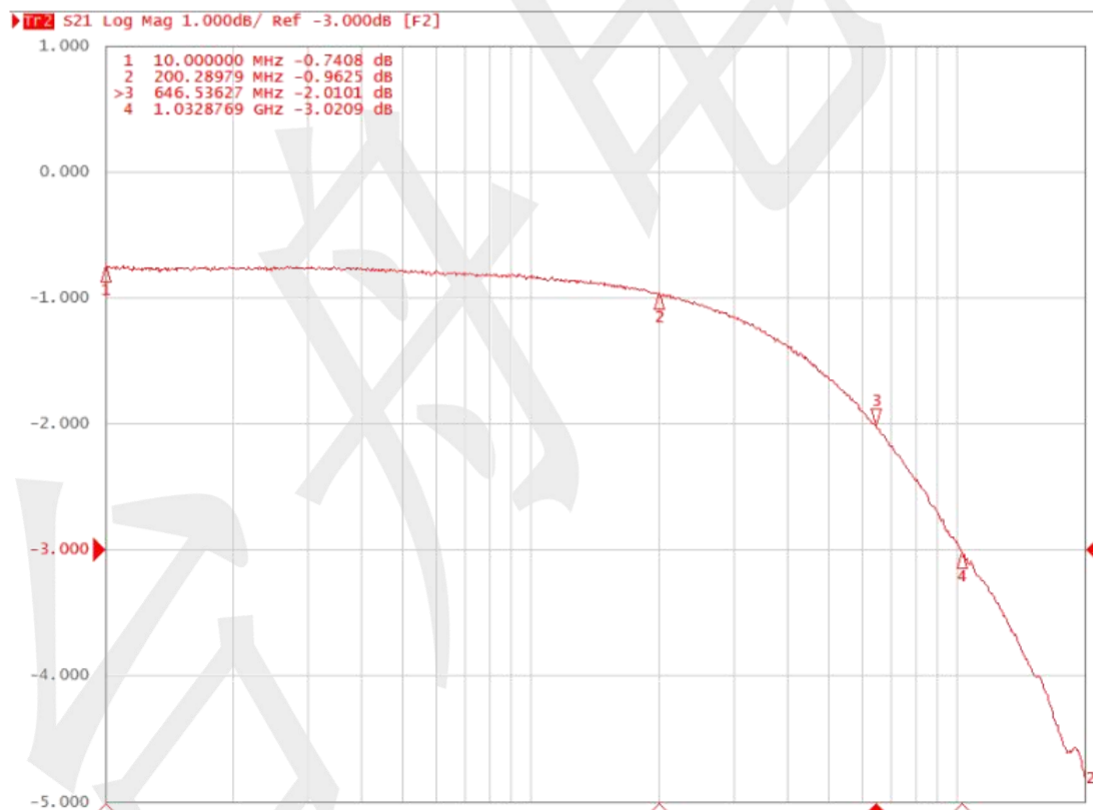


Fig.1 Switch Bandwidth or Insertion Loss

Typical Performance Curves (Ta=25°C, VDD=3.0V, CAP=0.1uF, unless otherwise noted)

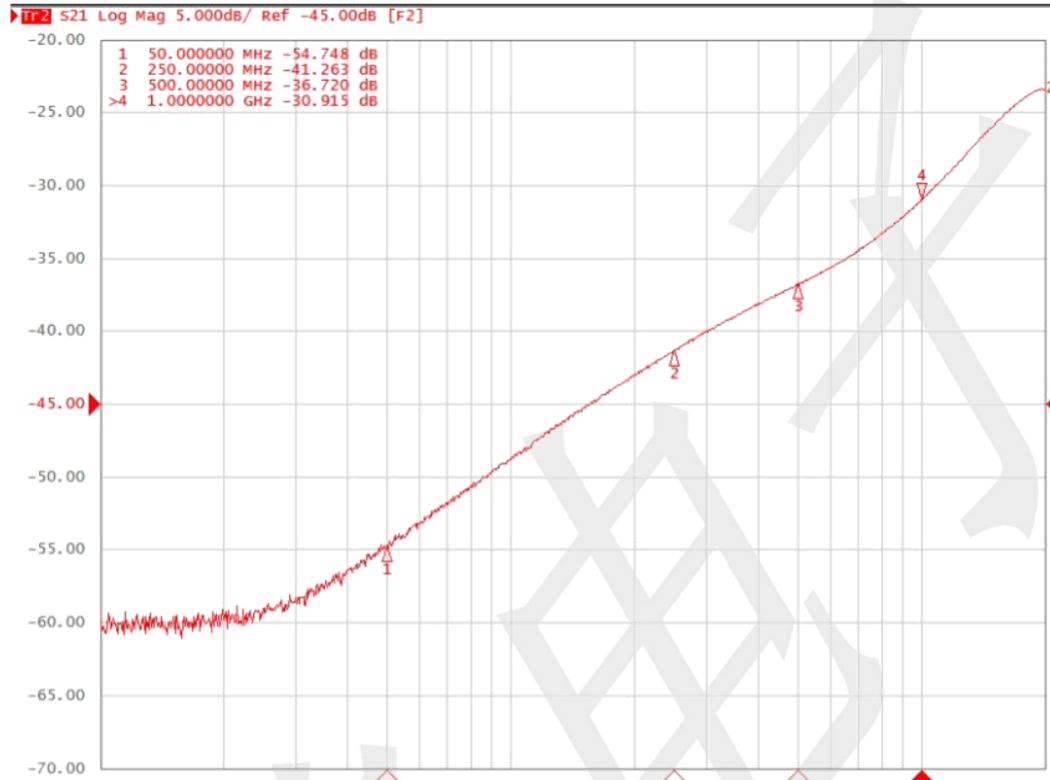


Fig.2 Switch Channel to Channel Cross-Talk

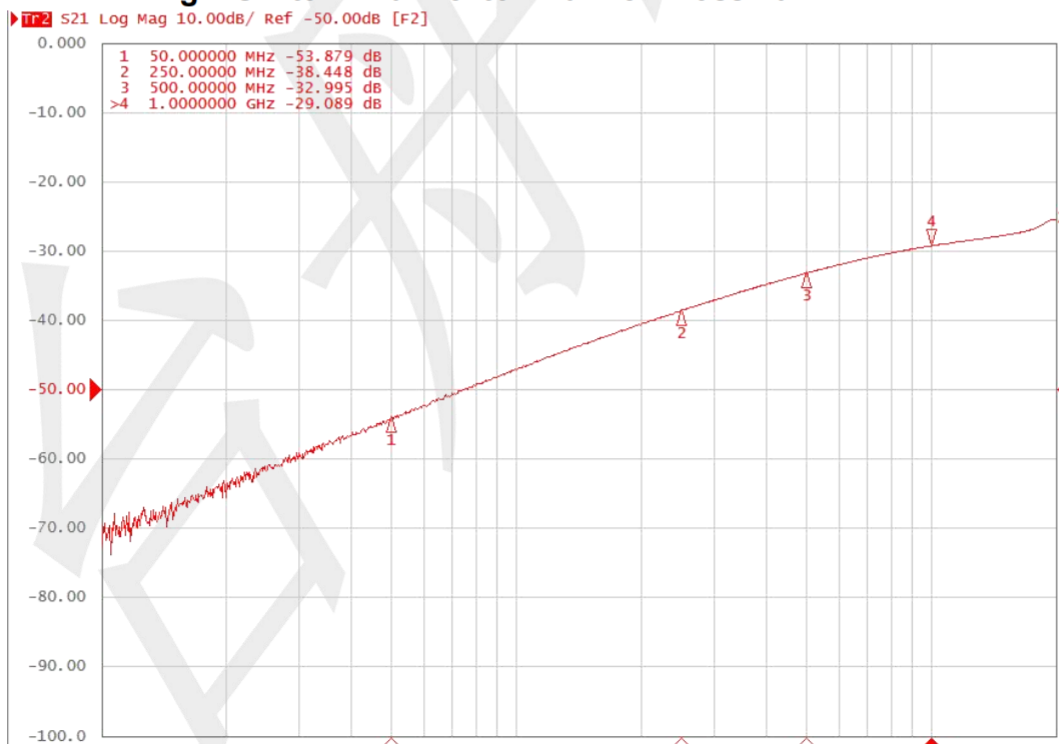
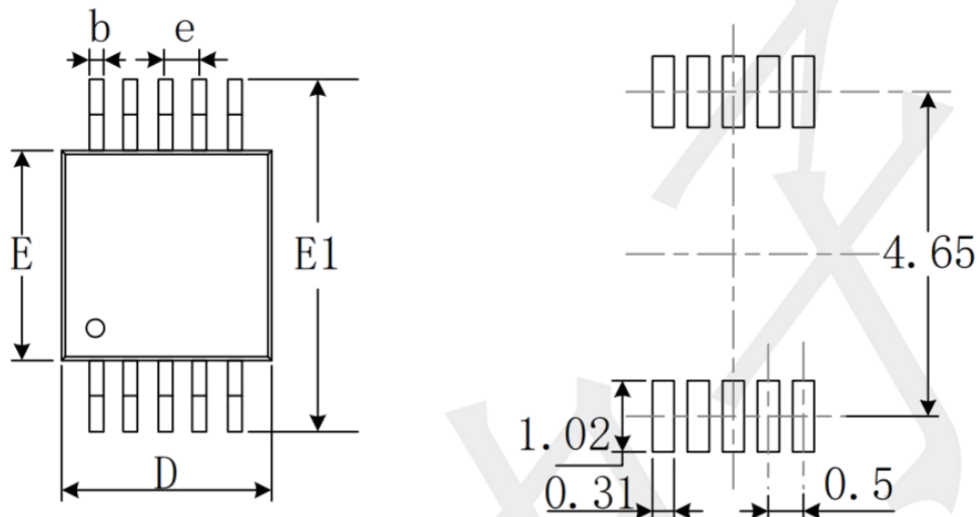


Fig.3 Switch Off Isolation

Package information

MSOP-10L



RECOMMENDED LAND PATTERN (Unit: mm)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.180	0.280	0.007	0.011
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
e	0.50(BSC)		0.020(BSC)	
E	2.900	3.100	0.114	0.122
E1	4.750	5.050	0.187	0.199
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°