

DIO3232B

Low-Power, USB2.0 High-Speed Switch

Features

- V_{CC} operation at 2.7V to 4.3V
- Low Con: 6.5pF Typical
- Low R_{on} : 6 Ω Typical
- Low Power Consumption: 1 μ A Maximum
- Low I_{CCT} : 15 μ A Max @ $V_{IN}=1.8V$, $V_{CC}=3.6V$
- -3dB Bandwidth: > 720MHz
- Packaged in Green DFN-10 and QFN-10
- 8kV HBM ESD Rating
2kV CDM ESD Rating
- Power-Off/On Protection on Common port,
D+/D- Pins Tolerate up to 5.25V

Descriptions

The DIO3232B is a low power, dual SPDT 2-port high-speed analog switch. It handles bi-directional signal flow and is optimized for switching a hi-speed (480Mbps) source or a full-speed (12Mbps) source.

DIO3232B has high channel-to-channel noise isolation and low bit-to-bit skew which allows it to pass high-speed differential signals with good signal integrity. Each switch offers little or no attenuation of the high-speed signals at the outputs.

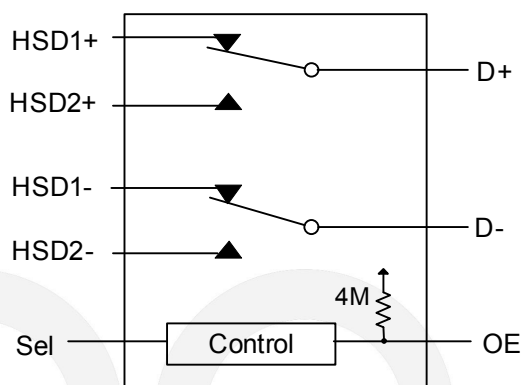
The DIO3232B contains special circuitry on the D+/D- pins, which can tolerate up to 5.25V when the USB devices are either powered off or powered on.

DIO3232B is available in two type Green packages: QFN-10 and DFN-10.

Applications

- Cell-Phone/PDA
- MP3/MP4/PMP
- STB/LCDTV

Block Diagram



Ordering Information

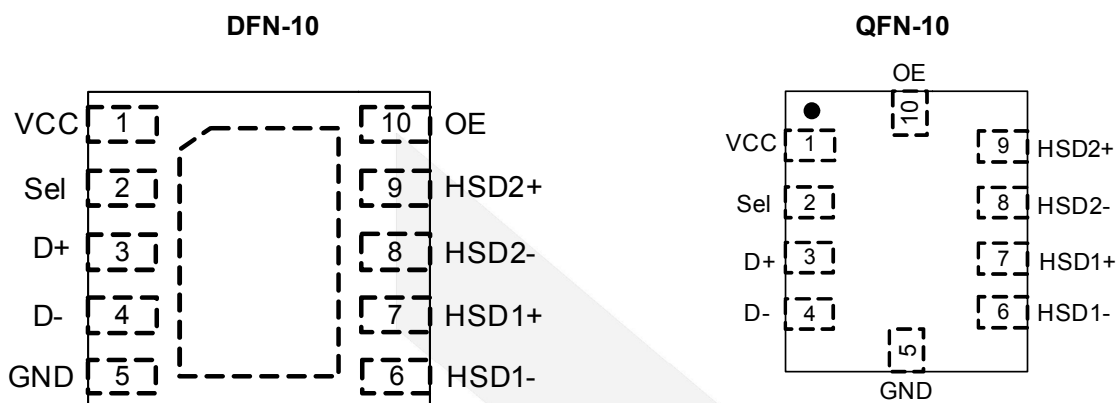
Order Part Number	Top Marking		T_A	Package	
DIO3232BDN10	3232B	Green	-40 to +85 $^{\circ}$ C	DFN-10 (3.0mm*3.0mm)	Tape & Reel, 5000
DIO3232BQN10	YWGZ	Green	-40 to +85 $^{\circ}$ C	QFN-10 (2.0mm*1.5mm)	Tape & Reel, 3000



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Pin Assignment



Pin Descriptions

Pin Name	Description
OE	Switch Enable
Sel	Switch Select
D+, D-	USB Data Bus
HSDn+, HSDn-	Multiplexed Source inputs

Truth Table

Sel	OE	Function
X	L	Disconnect
L	H	D+, D- = HSD1+, HSD1-
H	H	D+, D- = HSD2+, HSD2-



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Absolute Maximum Ratings

Stresses beyond those listed under “Absolute Maximum Rating” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other condition beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Symbol	Parameter	Min.	Max.	Unit
V_{CC}	Supply Voltage	-0.3	+4.6	V
V_{CNTRL}	DC input Voltage(S, OE)	-0.3	V_{CC}	V
V_{SW}	DC input I/O Voltage	-0.3	$V_{CC} + 0.3$	V
	DC input I/O Voltage (D+/D-)	-0.3	5.5	V
I_{IK}	DC input Diode current	-50		mA
I_{OUT}	DC output current		50	mA
T_{STG}	Storage Temperature	-65	+150	°C
ESD	HBM, JEDEC: JESD22-A114		8	kV
	CDM, JEDEC : JESD22-C101		2	

Recommend Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended Operating conditions are specified to ensure optimal performance to the datasheet specifications. DIOO does not Recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Min.	Max.	Unit
V_{CC}	Supply voltage	2.7	4.3	V
V_{CNTRL}	Control input voltage(S,OE)	0	V_{CC}	V
V_{SW}	Switch I/O voltage (HSD1±, HSD2±)	0	V_{CC}	V
	Switch I/O voltage (D+, D-)	0	5.25	V
T_A	Operating Temperature	-40	85	°C



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DC Electrical Characteristics

All typical value are at $T_A = 25^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Vcc(V)	Min.	Typ.	Max.	Unit
V_{IH}	Input voltage high		3.0 to 3.6	1.2			V
V_{IL}	Input voltage low		3.0 to 3.6			0.6	V
I_{IN}	Control input leakage	$V_{SW} = 0 \text{ to } V_{CC}$	3.6	-1		1	μA
I_{OZ}	Off state leakage	$0 \leq D_n, HSD1n, HSD2n \leq 3.6\text{V}$	3.6	-2		2	μA
I_{OFF}	Power-Off leakage current(All I/O ports)	$V_{SW} = 0\text{V to } 3.6\text{V}$, $V_{CC} = 0\text{V}$, See Figure 4	0	-2		2	μA
R_{ON}	HS switch on Resistance	$V_{SW}=0.4\text{V}, I_{ON}=8\text{mA}$, See Figure 3	3.0		6	8	Ω
ΔR_{ON}	HS Delta R_{ON}	$V_{SW}=0.4\text{V}, I_{ON}=8\text{mA}$	3.0		0.35		Ω
I_{CC}	Quiescent supply current	$V_{CNTRL}=0 \text{ or } V_{CC}$	3.6			1	μA
I_{CCT}	Increase in I_{CC} current per control voltage and V_{CC}	$V_{CNTRL}=2.6\text{V}, V_{CC}=3.6\text{V}$	3.6			10.0	μA
		$V_{CNTRL}=1.8\text{V}, V_{CC}=3.6\text{V}$	3.6			20.0	μA



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AC Electrical Characteristics

All typical value are for Vcc = 3.3V at 25°C unless otherwise specified

Symbol	Parameter	Conditions	Vcc(V)	Temp	Min.	Typ.	Max.	Unit
				(°C)				
t _{ON}	Turn-On time S, OE to output	R _L =50Ω, C _L =5pF, V _{SW} = 0.8V	3.0 to 3.6	full		15	30	ns
t _{OFF}	Turn-Off time S, OE to output	R _L =50Ω, C _L =5pF, V _{SW} = 0.8V	3.0 to 3.6	full		15	30	ns
t _{PD}	Propagation delay	R _L =50Ω, C _L =5pF	3.3	25°C		0.25		ns
				full			5.0	ns
t _{BBM}	Break-Before-Make	R _L =50Ω, C _L =5pF, V _{SW} =0.8V See Figure 9	3.0 to 3.6	25°C			5.0	ns
				full			10	ns
OIRR	Off Isolation	R _L =50Ω, f=240MHz See Figure 8	3.0 to 3.6	25°C		-30		dB
Xtalk	Non-Adjacent Channel Crosstalk	R _L =50Ω, f=240MHz See Figure 7	3.0 to 3.6	25°C		-45		dB
BW	-3dB bandwidth	R _L =50Ω, C _L =0pF See Figure 6	3.0 to 3.6	25°C		720		MHz
		R _L =50Ω, C _L =5pF See Figure 6		25°C		550		MHz
t _{SK(P)}	Skew of Opposite Transitions of the same output	R _L =50Ω, C _L =5pF	3.0 to 3.6	25°C		20		ps

Capacitance

Symbol	Parameter	Conditions	Temp	Min.	Typ.	Max.	Unit
			(°C)				
C _{IN}	Control Pin input Capacitance	V _{CC} =0V	25°C		1.5		pF
C _{ON}	D+/D- on Capacitance	V _{CC} =3.3V, OE=0V, f=240MHz See Figure 5	25°C		6.5		
C _{OFF}	HSD1n, HSD2n off capacitance	V _{CC} and OE=3.3V See Figure 5	25°C		2.5		

Specifications subject to change without notice.

Test Diagrams

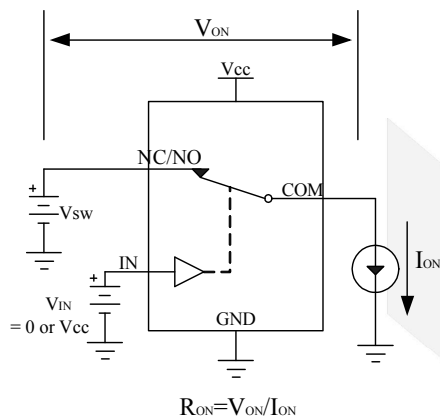


Figure 2. Switch on resistor

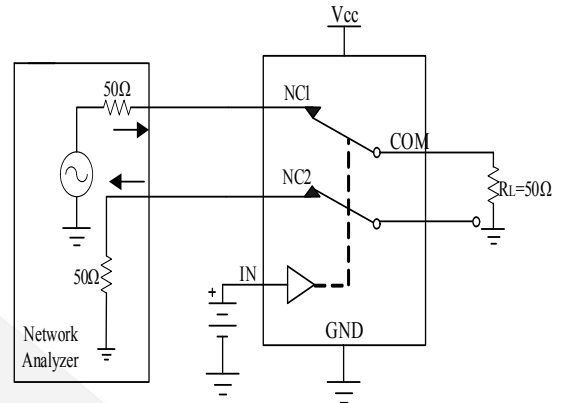


Figure 6. Channel-to-channel crosstalk

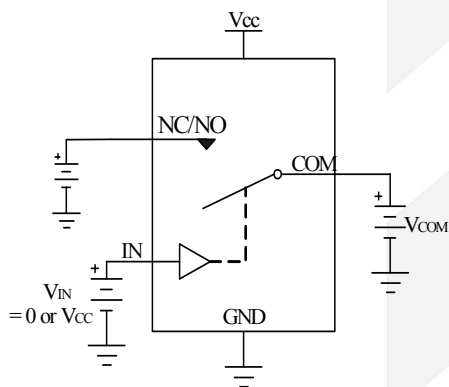


Figure 3. Switch Off Leakage

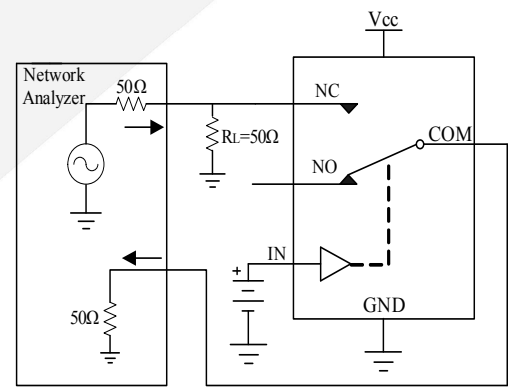


Figure 7. Off-isolation

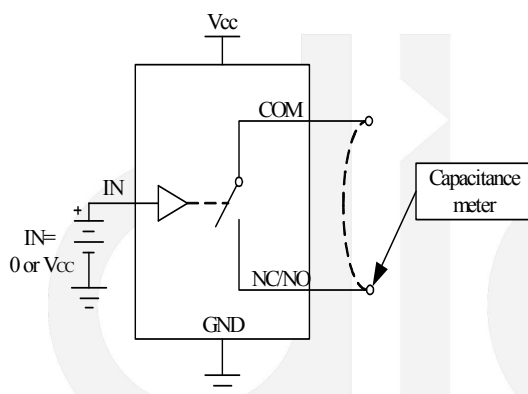


Figure 4. Break-Before-Make Time

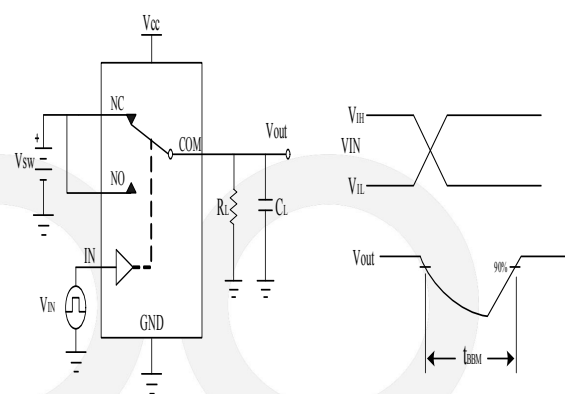


Figure 8. Break-Before-Make

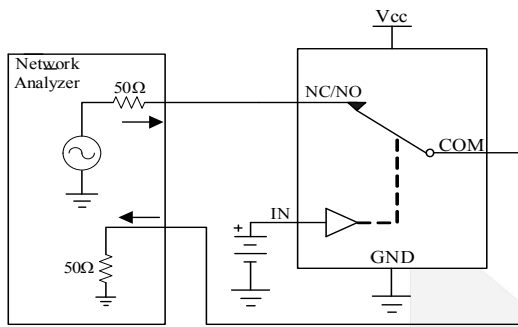


Figure 5. Bandwidth

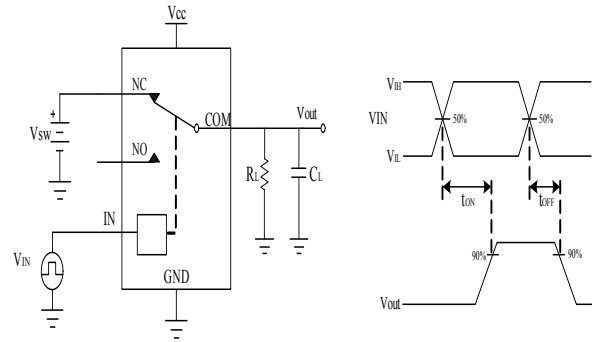
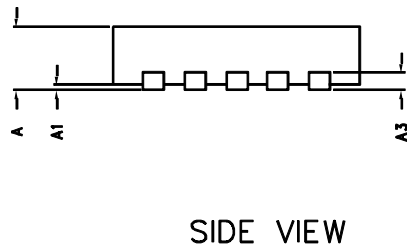
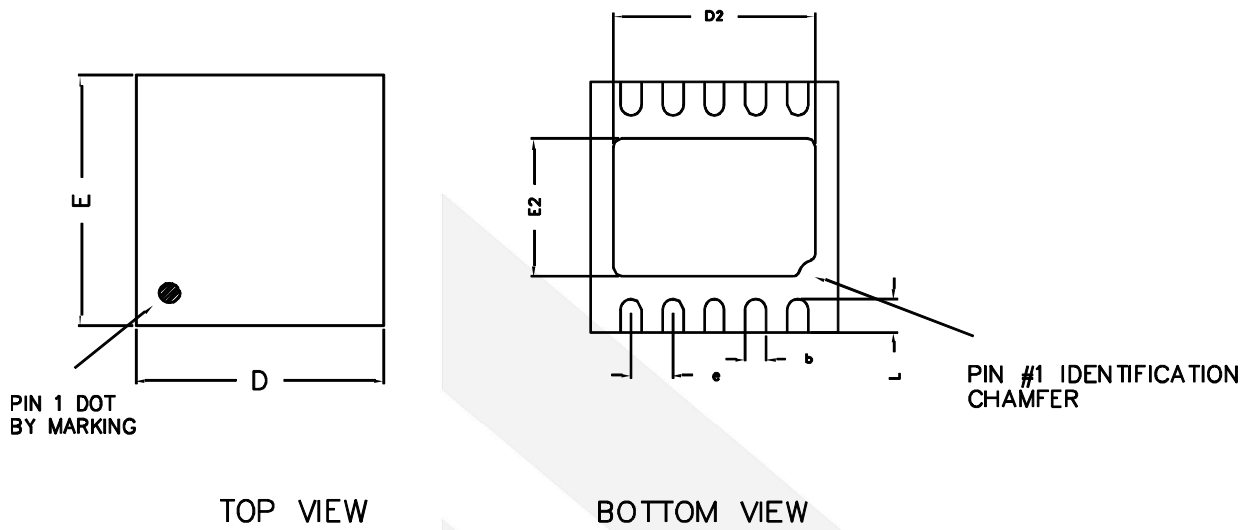


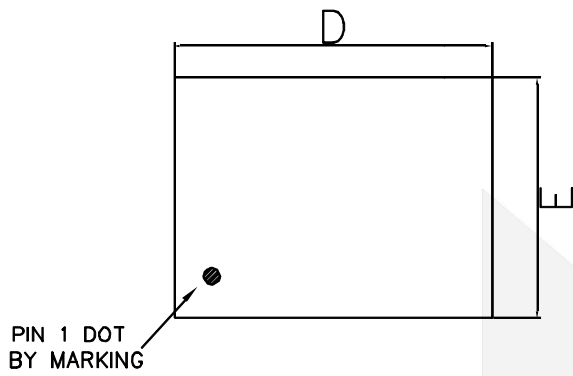
Figure 9. Turn-On/Turn-Off

Physical Dimensions: DFN-10

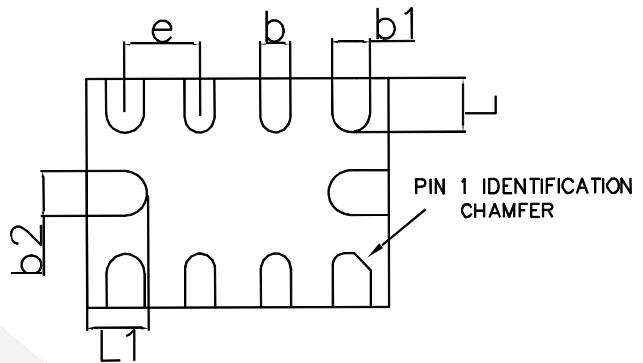


COMMON DIMENSIONS(MM)			
PKG.	W:VERY VERY THIN		
REF.	MIN.	NOM	MAX
A	0.70	0.75	0.80
A1	0.00		0.05
A3	0.20 REF.		
D	2.95	3.00	3.05
E	2.95	3.00	3.05
b	0.18	0.25	0.30
L	0.30	0.40	0.50
D2	2.30	2.45	2.55
E2	1.50	1.65	1.75
e	0.50 BSC		

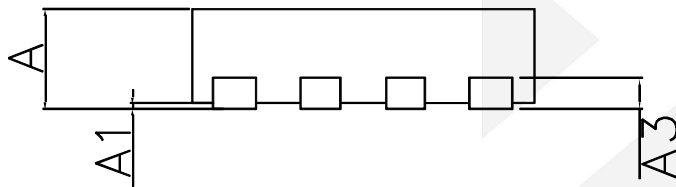
Physical Dimensions: QFN-10



TOP VIEW



BOTTOM VIEW



SIDE VIEW

COMMON DIMENSIONS(MM)			
PKG.	ULTRA THIN		
REF.	MIN.	NOM	MAX
A	0.50	0.55	0.60
A1	0.00		0.05
A3	0.15 REF.		
D	1.95	2.00	2.05
E	1.45	1.50	1.55
b	0.15	0.20	0.25
b1	0.20	0.25	0.30
b2	0.25	0.30	0.35
L	0.30	0.35	0.40
L1	0.35	0.40	0.45
e	0.50 BSC		



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CONTACT US

Dioo is a professional design and sales corporation for high-quality and performance analog semiconductors. The company focuses on industry markets, such as, cell phone, handheld products, laptop, and medical equipment and so on. Dioo's product families include analog signal processing and amplifying, LED drivers and charger IC. Go to <http://www.dioo.com> for a complete list of Dioo product families.

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