

DIO3203

3:1-USB 2.0 High-Speed/UART/ Audio Switch

Features

- Low Ron Audio/USB/UART switch
- Low USB Con: 6.8pF
- -1.4V Negative Signal Swing Capable
- USB Switch -3dB Bandwidth: 720MHz
- High Crosstalk and Off-isolation
- Voltage Supply Operation: 2.7V to 5.5V
- 5.5V Tolerant on COM Pin
- Green Packaged: TQFN-16, DQFN-12
- 4kV HBM ESD Rating, 2kV CDM ESD Rating

Descriptions

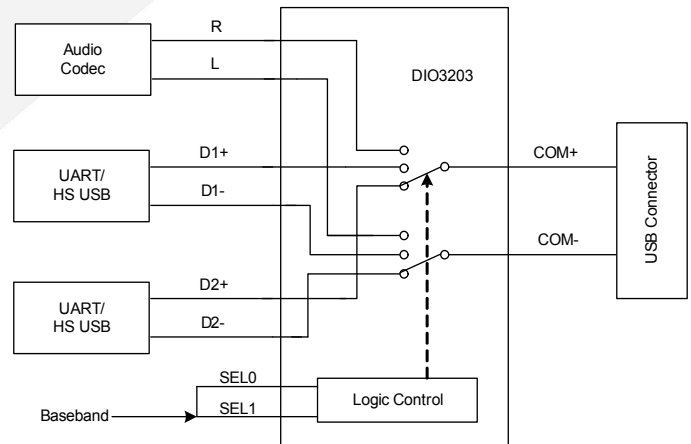
The DIO3203 is a SP3T (Single Pole/Triple Throw) switch which combines low distortion audio, UART channel and accurate USB 2.0 high-speed data signal switching in the same low voltage device. This architecture is designed to allow negative signal passing as low as -1.4V below ground.

It is available in TQFN-16 and DQFN-12 packages, and operates over a temperature range of -40°C to 85°C.

Applications

- Cell Phones
- PDAs and MP3s
- Portable Instrumentation
- Battery Powered Communications
- Computer Peripherals

Block Diagram



Ordering Information

Order Part Number	Top Marking	Green	T _A	Package	
DIO3203LP16	D3203	Yes	-40 to +85°C	TQFN 3*3-16	Tape & Reel, 5000
DIO3203LN12	YWHB	Yes	-40 to +85°C	DQFN 1.8*1.8-12	Tape & Reel, 3000

Pin Assignment

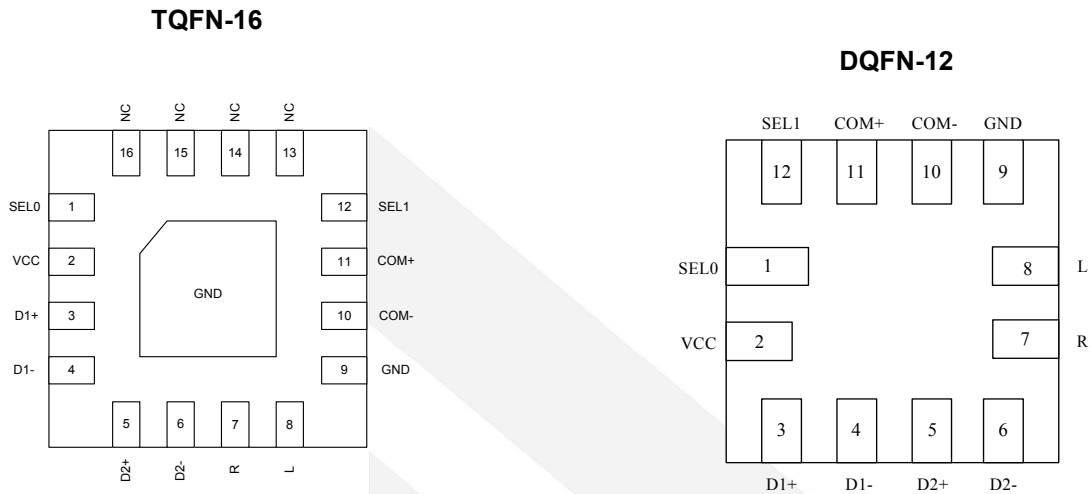


Figure 1 Top View

Pin Descriptions

Pin Name	Direction	Description
Vcc	P	Power Supply
GND	P	Ground
D1+	I/O	HS/UART Channel 1 D+ Signal
D1-	I/O	HS/UART Channel 1 D- Signal
D2+	I/O	HS/UART Channel 2 D+ Signal
D2-	I/O	HS/UART Channel 2 D- Signal
R	I/O	Right Audio Signal
L	I/O	Left Audio Signal
COM+	I/O	COM+ Signal, and share D1+, D2+, R
COM-	I/O	COM- Signal, and share D1-, D2-, L
SEL0/SEL1	I	Switch selection pins

Truth Table

SEL 1	SEL 0	D1+, D1-	D2+, D2-	R, L
0	0	OFF	OFF	OFF
0	1	ON	OFF	OFF
1	0	OFF	ON	OFF
1	1	OFF	OFF	ON



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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	-0.5	6.0	V
V _{SW}	USB/UART input I/O Voltage	-0.5	6.0	V
	Audio input I/O Voltage	-2.0	6.0	
	Other Channels	-0.5	6.0	
I _{IK}	DC input Diode current	-50		mA
I _{SW}	USB/UART I/O Current		50	mA
	Audio I/O Current		60	
	Other Channels		50	
I _{PEAK}	I/O Peak Current		150	mA
T _{STG}	Storage Temperature	-65	+150	°C
ESD	HBM, JEDEC: JESD22-A114		4	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	5.5	V
V _{SW}	USB/UART I/O voltage	0	5	V
	Audio I/O voltage	-1.4	V _{CC}	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)	Temp	Min.	Typ.	Max.	Unit
				($^\circ\text{C}$)				
V_{IH}	Input voltage high		3.2 to 5	full	1.5			V
V_{IL}	Input voltage low		3.2 to 5	full			0.6	V
I_{IN}	Control input leakage	$V_{SW} = 0$ to V_{CC}	5	full	-1		1	μA
I_{OZ}	Off state leakage	$0 \leq D_n, COM \leq 5V$	5	full	-2		2	μA
I_{OFF}	Power-Off leakage current(All I/O ports)	$V_{SW} = 0V$ to $5V, V_{CC} = 0V$	0	full			10	μA
R_{ONUSB}	HS USB switch on Resistance	$V_{SW}=0.4V, I_{ON}=8mA$	3.2 to 5	full		3.5	6	Ω
T_{BMM}	Break Before Make Time		3.2 to 5	full		190		μs
$R_{ONAUDIO}$	Audio switch on Resistance	$V_{SW}=-0.8V, 0.8V, I_{ON}=30mA$	3.2 to 5	full		1.6	3	Ω
R_{FLAT}	Audio Ron Flatness	$V_{SW}=-0.8V, 0.8V, I_{ON}=30mA$	5	full		0.4		Ω
R_{TERM}	Internal Termination Res.		3.2 to 5	full		1		$k\Omega$
I_{CCSL}	Battery Supply Sleep Mode Average Current	Static Current SEL=0	3.2 to 5	full			1	μA
I_{CC}	Battery Supply Active Mode Average Current	$V_{CC}=5V$	5	full		72	110	μA
I_{CCT}	Increase in I_{CC} current per control voltage and V_{CC}	$V_{CTRL}=2.8V, V_{CC}=5V$	3.2 to 5	full		5	10	μA
		$V_{CTRL}=1.8V, V_{CC}=5V$	3.2 to 5	full		11	15	μA



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AC Electrical Characteristics

All typical value are for Vcc = 5V at 25°C unless otherwise specified.

Symbol	Parameter		Conditions	Vcc(V)	Temp	Min.	Typ.	Max.	Unit
					(°C)				
OIRR	Audio Rejection R/L to COM±		R _L =32Ω, f=20kHz	5	25°C		-100		dB
	USB Rejection Dn± to COM±		R _L =50Ω, f=1MHz				-85		
			R _L =50Ω, f=240MHz				-36		
Xtalk	Active Channel COM+ to COM-	Audio	R _L =32Ω, f=20kHz	5	25°C		-95		dB
		USB/ UART	R _L =50Ω, f=1MHz				-75		
			R _L =50Ω, f=240MHz				-36		
BW	HS USB Channel -3dB bandwidth		R _L =50Ω, C _L =0pF	5	25°C		720		MHz
			R _L =50Ω, C _L =5pF				550		MHz
THD+N	Audio Channel Total Harmonic Distortion+Noise		20Hz to 20kHz, R _L =16Ω, 1.6V _{PP} input	5	25°C		0.3		%
			20Hz to 20kHz, R _L =32Ω, 1.6V _{PP} input				0.5		

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}	USB Mode on Capacitance	V _{CC} =5V, f=1MHz	25°C		6.8		
C _{OFF}	USB Mode off capacitance	V _{CC} =5V	25°C		4.0		

Applications Design Guide

DIO3203 is specially designed for mobile product applications housed in ultra small QFN package. Internal regulated negative supply ensures up to -1.4V negative signal handling capability independent of VCC supply. For example, under Vcc at 2.8V or 4.2V battery supply, the audio channel can take up to -1.4V negative audio inputs, which is a strong competitive edge over other solution in the market.

At system design level, we recommend:

- 1 Each time, when switch to audio channel from USB channel, always turn ON the audio switch channel before applying the audio signal to L/R pins. Minimum of 10ms interval is recommended.
- 2 For reliable USB channel communications with minimum interference, under USB mode, audio signals should be disconnected at the same time with no active audio signal at L/R pins.
- 3 Always place minimum 0.1uF bypass capacitors close to the DIO3203 VCC supply pins.
- 4 Always place DIO3203 as close as possible to the input/output of USB controllers to minimize the signal edge distortion.
- 5 Minimize the trace length difference between D+ and D- lines for best jitter performance.

Eye Pattern Compliance

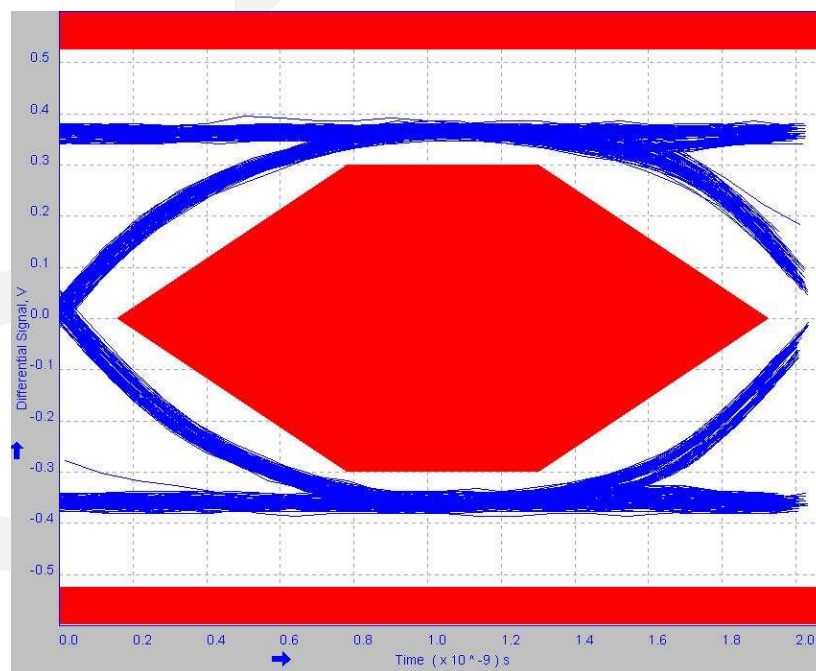


Figure 3. Eye Pattern 480MHz USB Signal with Switch

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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