

DIO1713

CMOS Low Voltage, 4Ω Quad, SPST Switches

Features

- 1.8 V to 5.5 V single supply
- Low on resistance (2.5Ω Typ)
- Low on resistance flatness
- -3dB bandwidth > 200MHz
- Rail-to-rail operation
- 16-lead TSSOP and SOIC packages
- Fast switching times: $t_{ON}=16ns$, $t_{OFF}=10ns$
- Typical power consumption (<0.01μW)
- TTL/CMOS compatible
- Qualified for automotive applications

Descriptions

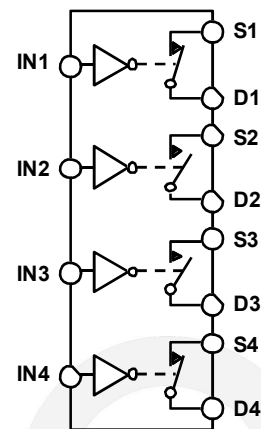
The DIO1713 is monolithic CMOS device containing four independently selectable switches. The switch is designed on an advanced submicron process that provide low power dissipation yet give high switching speed, low on resistance, low leakage currents, and high bandwidth.

They are designed to operate from a single 1.8 V to 5.5 V supply, making them ideal for use in battery-powered instruments and with the new generation of DACs and ADCs from Analog Devices, Inc. Fast switching times and high bandwidth make the parts suitable for switching USB 1.1 data signals and video signals.

Applications

- USB 1.1 signal switching circuits
- Cell phones
- PDAs
- Battery-powered systems
- Communication systems
- Sample hold systems
- Sample hold systems
- Audio signal routing
- Video switching
- Mechanical reed relay replacement

Block Diagram



Ordering Information

Order Part Number	Top Marking		T _A	Package	
DIO1713SO16	DIO1713	Green	-40 to +85°C	SOIC-16	Tape & Reel, 2500
DIO1713TP16	DIO1713	Green	-40 to +85°C	TSSOP-16	Tape & Reel, 2500



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Pin Assignment

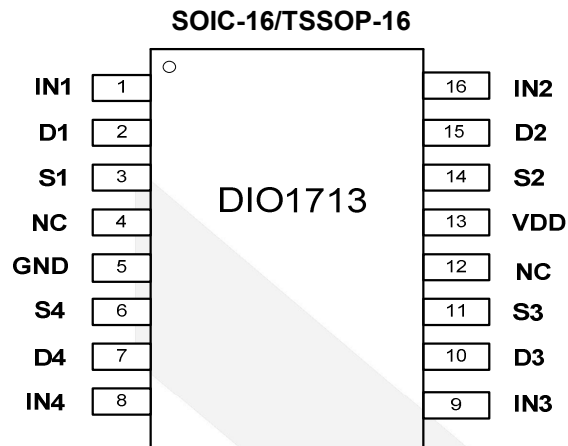


Figure 1 Top View

Pin Descriptions

Pin Name	Description
IN1	Digital Control Input. Its logic state controls the status of the Switch S1-D1.
D1	Drain Pin. Can be used as input or output.
S1	Source Pin. Can be used as input or output.
NC	Not internally connected.
GND	The most negative power supply pin.
S4	Source Pin. Can be used as input or output.
D4	Drain Pin. Can be used as input or output.
IN4	Digital Control Input. Its logic state controls the status of the Switch S4-D4.
IN3	Digital Control Input. Its logic state controls the status of the Switch S3-D3.
D3	Drain Pin. Can be used as input or output.
S3	Source Pin. Can be used as input or output.
NC	Not internally connected.
VDD	The most positive power supply pin.
S2	Source Pin. Can be used as input or output.
D2	Drain Pin. Can be used as input or output.
IN2	Digital Control Input. Its logic state controls the status of the Switch S3-D3.

Truth Table

Logic	Switch 1,4	Switch 2,3
0	Off	On
1	On	Off



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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.

Parameter			Rating	Unit
VDD to GND			-0.3 to +6	V
Analog, Digital Inputs			-0.3 to V _{DD} +0.3 Or 30mA, whichever occurs first	V
Continuous Current, S or D			30	mA
Peak Current, S or D			100	mA
Operating Temperature Range			-40 to +85	°C
Storage Temperature Range			-65 to +150	°C
Junction Temperature			150	°C
Power Dissipation	TSSOP-16		430	mW
Thermal Impedance	TSSOP-16	Θ _{JA}	150	°C/W
		Θ _{JC}	27	°C/W
Power Dissipation	SOIC-16		520	mW
Thermal Impedance	SOIC-16	Θ _{JA}	125	°C/W
		Θ _{JC}	42	°C/W
ESD	HBM		7.5	kV



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Electrical Characteristics

$V_{DD}=+5V \pm 10\%$, $GND=0V$. All typical value is at $-40^{\circ}C$ to $85^{\circ}C$, unless otherwise specified.

Parameter	Conditions	Temp. (°C)	Min.	Typ.	Max.	Unit
Analog Switch						
Analog Signal Range		-40 to +85	0		V _{DD}	V
On Resistance (R _{ON})	V _S =0V to V _{DD} , I _S =-10mA	25		2.5	4	Ω
		-40 to +85			4.5	
On Resistance Match Between Channels (Δ R _{ON})	V _S =0V to V _{DD} , I _S =-10mA	-40 to +85		0.05	0.3	Ω
On Resistance (R _{FLAT(ON)})	V _S =0V to V _{DD} , I _S =-10mA	25		0.5		Ω
		-40 to +85			1.0	
Leakage Currents						
Source Off Leakage I _S (Off)	V _{DD} =+5.5V, V _S =4.5V/1V, V _D =1V/4.5V	25		±0.01	±0.1	nA
		-40 to +85			±0.2	
Drain Off Leakage I _D (Off)	V _{DD} =+5.5V, V _S =4.5V/1V, V _D =1V/4.5V	25		±0.01	±0.1	nA
		-40 to +85			±0.2	
Channel On Leakage I _D ,I _S (On)	V _{DD} =+5.5V, V _S = V _D =1V or 4.5V	25		±0.01	±0.1	nA
		-40 to +85			±0.2	
Digital Inputs						
Input High Voltage, V _{INH}		-40 to +85	4			V
Input Low Voltage, V _{INL}		-40 to +85			0.4	V
Input Current, I _{INL} or I _{INH}	V _{IN} =V _{INL} or V _{INH}	25		0.005		μA
		-40 to +85			±0.1	
Dynamic Characteristics						
t _{ON}	R _L =300Ω, C _L =35pF, V _S =3V	25		11		ns
		-40 to +85			16	
t _{OFF}	R _L =300Ω, C _L =35pF, V _S =3V	25		6		ns
		-40 to +85			10	
Charge Injection	V _S =2V, R _S =0Ω, C _L =1nF	25		3		pC
Off Isolation	R _L =50Ω, C _L =5pF, f=10MHz	25		-58		dB
	R _L =50Ω, C _L =5pF, f=1MHz	25		-78		
Channel-to-Channel Crosstalk	R _L =50Ω, C _L =5pF, f=10MHz	25		-90		dB
Bandwidth -3dB	R _L =50Ω, C _L =5pF	25		200		MHz
C _S		25		10		pF
C _D		25		10		pF
C _D , C _S (On)		25		22		pF
Power Requirements						
I _{DD}	V _{DD} =+5.5V, Digital inputs = 0V or 5V	25		0.001		μA
		-40 to +85			1.0	



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Electrical Characteristics

V_{DD}=+3V ± 10%, GND=0V. All typical value is at -40°C to 85°C, unless otherwise specified.

Parameter	Conditions	Temp. (°C)	Min.	Typ.	Max.	Unit
Analog Switch						
Analog Signal Range		-40 to +85	0		V _{DD}	V
On Resistance (R _{ON})	V _S =0V to V _{DD} , I _S =-10mA	25		5	5.5	Ω
		-40 to +85			8	
On Resistance Match Between Channels (Δ R _{ON})	V _S =0V to V _{DD} , I _S =-10mA	25		0.1		Ω
		-40 to +85			0.3	
On Resistance (R _{FLAT(ON)})	V _S =0V to V _{DD} , I _S =-10mA	-40 to +85		2.5		Ω
Leakage Currents						
Source Off Leakage I _S (Off)	V _{DD} =+3.3V, V _S =3V/1V, V _D =1V/3V	25		±0.01	±0.1	nA
		-40 to +85			±0.2	
Drain Off Leakage I _D (Off)	V _{DD} =+3.3V, V _S =3V/1V, V _D =1V/3V	25		±0.01	±0.1	nA
		-40 to +85			±0.2	
Channel On Leakage I _D , I _S (On)	V _{DD} =+3.3V, V _S = V _D =1V or 3V	25		±0.01	±0.1	nA
		-40 to +85			±0.2	
Digital Inputs						
Input High Voltage, V _{INH}		-40 to +85	2.4			V
Input Low Voltage, V _{INL}		-40 to +85			0.3	V
Input Current, I _{INL} or I _{INH}	V _{IN} =V _{INL} or V _{INH}	25		0.005		μA
		-40 to +85			±0.1	
Dynamic Characteristics						
t _{ON}	R _L =300Ω, C _L =35pF, V _S =2V	25		13		ns
		-40 to +85			20	
t _{OFF}	R _L =300Ω, C _L =35pF, V _S =2V	25		7		ns
		-40 to +85			12	
Charge Injection	V _S =1.5V, R _S =0Ω, C _L =1nF	25		3		pC
Off Isolation	R _L =50Ω, C _L =5pF, f=10MHz	25		-58		dB
	R _L =50Ω, C _L =5pF, f=1MHz	25		-78		
Channel-to-Channel Crosstalk	R _L =50Ω, C _L =5pF, f=10MHz	25		-90		dB
Bandwidth -3dB	R _L =50Ω, C _L =5pF	25		200		MHz
C _S		25		10		pF
C _D		25		10		pF
C _D , C _S (On)		25		22		pF
Power Requirements						
I _{DD}	V _{DD} =+3.3V, Digital inputs = 0V or 3V	25		0.001		μA
		-40 to +85			1.0	

Test Circuits

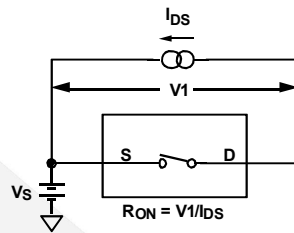


Figure 2. On Resistance

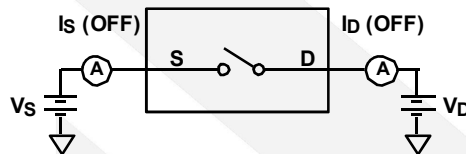


Figure 3. Off Leakage

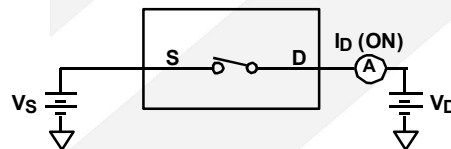


Figure 4. On Leakage

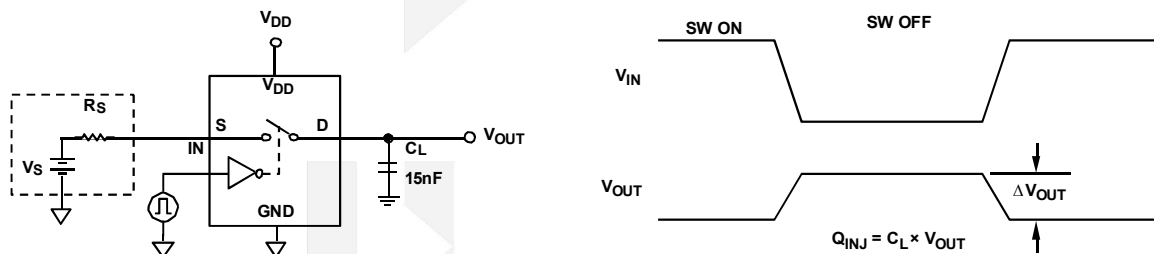


Figure 5. Charge Injection

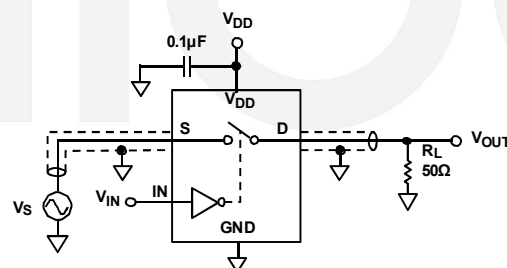


Figure 6. Off Isolation

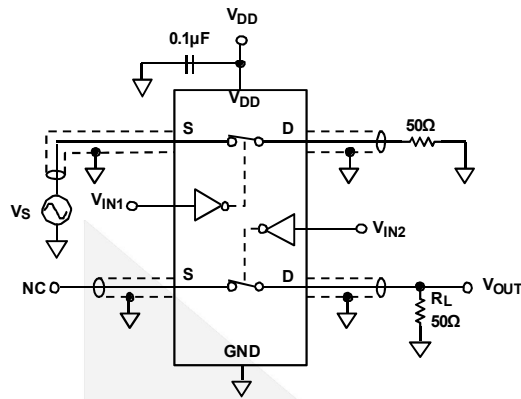


Figure 7. Channel-to Channel Crosstalk

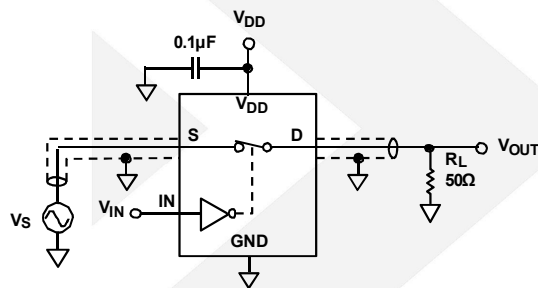
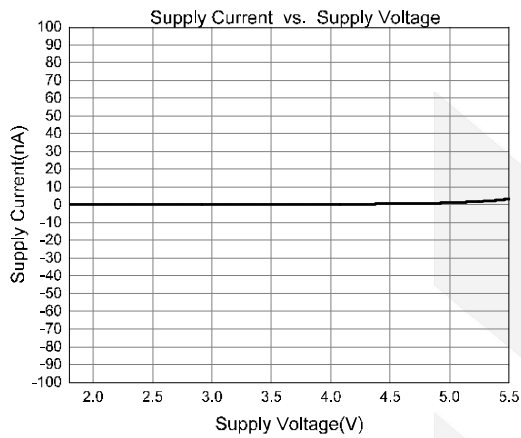


Figure 8. Bandwidth

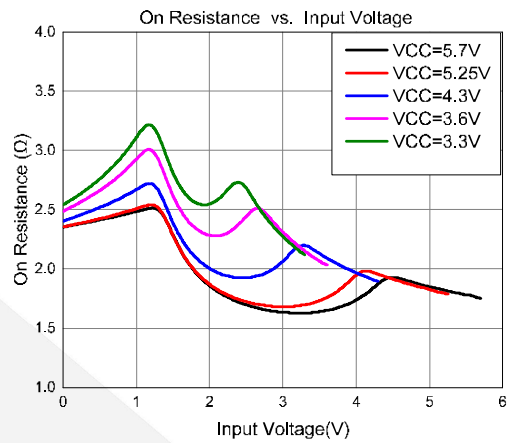
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Typical Performance Characteristics

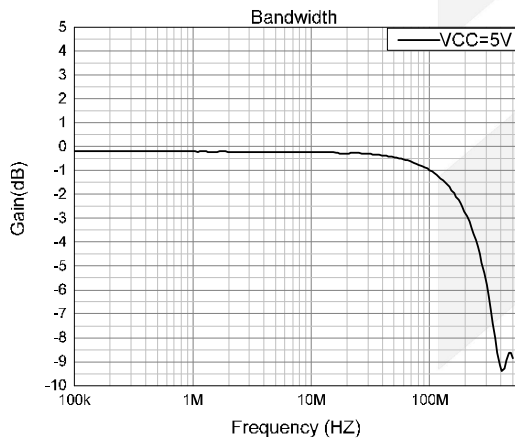
I_{DD} vs. V_{DD}



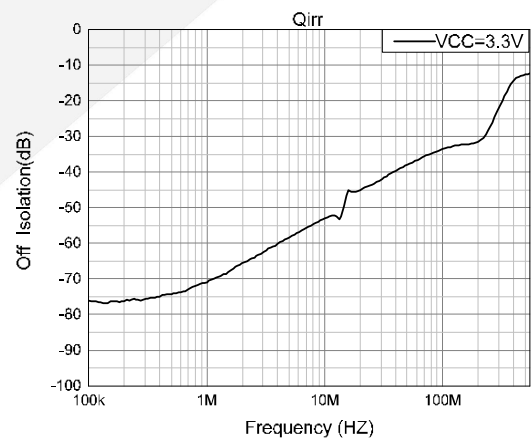
On Resistance vs. V_{DD}



Bandwidth



Q_{irr}



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.

For additional product information, or full datasheet, please contact with our Sales Department or Representatives.